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ABSTRACT

This guide provides complete directions for searching the Computerized Task Inventory (COMTASK) database or for adding information to or modifying information in the database. (The COMTASK database contains information about jobs and the duties, tasks, and equipment needed to perform each job.) Chapter I describes the guide, its purpose, and the updating procedures. Chapter II provides a history and description of COMTASK, covers the types of information currently available from COMTASK, and indicates future directions COMTASK will take with a brief description of the type of information needed to make the database viable and useful. The steps to be taken to begin or end a search or other computer connection with COMTASK are found in chapter III. Chapter IV contains directions for directing a search. Examples of several menus are displayed, with detailed explanations of alternatives. Chapter V describes procedures for adding information to COMTASK. Chapter VI explains how to access "HELP" menus that are found in each menu. Chapter VII describes options for displaying search results. Chapter VIII covers problems that may be encountered when using the database, possible causes, and solutions. A COMTASK Database Tree Chart and an explanation of "union," "intersection," and "minus" are appended. (YLB)

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COMTASK User's Guide

(Draft)

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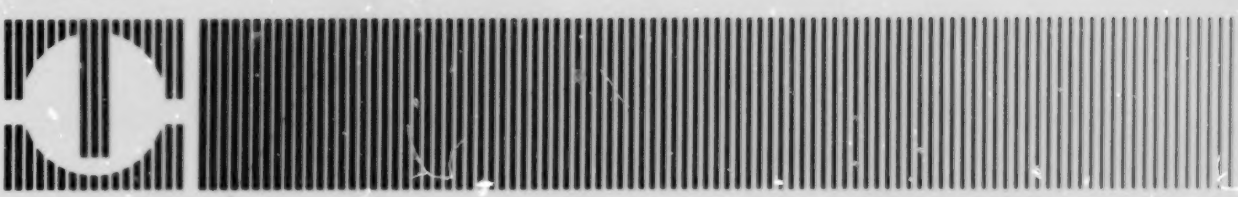

OFFICE FOR RESEARCH IN HIGH TECHNOLOGY EDUCATION
The University of Tennessee College of Education

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COMTASK User's Guide

(Draft)

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Foreword

The Computerized Task Inventory (COMTASK) Project at The University of Tennessee is designed to take advantage of advances in computer databases, the need for current job analysis information, and the ease of retrieving information with a computer. As part of COMTASK, a job analysis database has been designed to build upon existing job analysis procedures and information.

As a job changes, tasks and equipment that are part of the job's requirements may also change. Similarly, skills acquired by people working at that job also change. Thus, the COMTASK database is designed to allow job information to be modified to reflect these changes in tasks, equipment, or workers' characteristics.

The COMTASK Project staff worked on three related activities: the development of a database and the generation of two accompanying documents. The computer program to access the database was designed so information could be retrieved and so new information could be added or existing information could be modified.

This document, the User's Guide, explains how to access the database to retrieve, add, or modify information. A related document, Procedures for Conducting a Job Analysis: A Manual for the COMTASK Database, describes how a job analysis should be conducted, and how the information should be structured for entry into the database. The manual is designed to be used by those who want to conduct job analyses. It contains the COMTASK process for gathering job information and the guidelines to be used for gathering current information about jobs.

Every attempt has been made to make the procedures for using the computer software both understandable and easy to follow. This User's Guide is labeled as a "Draft" for two reasons: (1) at the time it was completed some aspects of the program were still being written and (2) while the User's Guide has been used and tested by COMTASK staff members, it has not been used by non-staff members.

ABSTRACT

The COMTASK User's Guide provides complete directions for searching the Computerized Task Inventory (COMTASK) database or for adding information to the database. The COMTASK database contains information about jobs. For each job listed in the database, the following information is available: (a) job title and description, (b) D.O.T. name, number, and description, (c) CIP name, number, and description, (d) list of duties, (e) list of tasks, (f) list of equipment, and (g) demographic information about workers surveyed and the companies where they work. Some of the chapters describe how to begin or end your computer connection; how to search the database; how to add to or modify information in the database; and how to resolve some difficulties you might encounter. An outline of the strategy for using the computer is included as are copies of over 70 computer screen displays.

ACKNOWLEDGMENTS

Many people have contributed to the development of the COMTASK User's Guide. This includes the programmers, the users and reviewers of the COMTASK Manual who contributed the initial material for the database, and the members of the advisory committee or Input/User Group.

The programmers were led by Ann Wayburn. She was assisted by three capable and hard working men: Shelley R. Heard, Swaminathan Natarajan, and Sakthikumar Subramanian. The User's Guide is a reflection of their programming skills and their skills at systems analysis.

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CHAPTER I
INTRODUCTION

The COMTASK User's Guide is designed to help you get information from the COMTASK database. The COMTASK database contains information about jobs, and the duties, tasks, and equipment needed to perform each job. The User's Guide is divided into eight major chapters. This first chapter describes the guide, its purpose, and the updating procedures. Chapter two is titled "A Brief Look at COMTASK" and provides a history and description of COMTASK, covers the types of information currently available from COMTASK, and indicates of future directions that COMTASK will take with a brief description of the type of information needed to make COMTASK a viable and useful database.

The third chapter of this User's Guide contains the steps to be taken to begin or end a search or other computer connection with COMTASK. The guide also contains directions for changing your password.

The fourth chapter is the most detailed part of the COMTASK User's Guide. In this chapter are found directions for conducting a search. Examples of several of the menus are displayed, with detailed explanations of alternatives.

Chapter five describes the procedures for adding information to the COMTASK database. Information that can be added includes a job inventory and the results from administering the inventory to a group of workers.

Chapters three, four, and five illustrate some of the menus displayed on the computer screen encountered when you are using COMTASK. For each menu there is a "HELP" menu to further explain the menu. Chapter six explains how to access these "HELP" menus.

The results of your search can be seen in several different ways: (a) view it on the screen of your terminal; (b) print it directly at your location; or (c) have the results printed at COMTASK and mailed to you. The way for you to get each of these is explained in Chapter seven.

The last chapter -- Chapter eight -- is one you should seldom need. It covers some of the problems you might encounter because of a COMTASK system problem, a telecommunications problem, or some other difficulty.

Purpose

The COMTASK User's Guide is designed to provide complete directions to enable a search of the COMTASK database or to add information to COMTASK. Both the COMTASK database and this guide have been developed so that a person does not have to be an expert at using a computer database. As you become more experienced at searching COMTASK you can take some shortcuts. The purpose of the guide is to explain how to search COMTASK either with or without the shortcuts.

Updating Procedures

As the COMTASK system evolves and more capabilities are added, the COMTASK User's Guide will have to be updated. These updates will cover explanations of new procedures and revisions of existing ones. Availability of updates to the COMTASK User's Guide will be announced in the COMTASK Database Bulletin Board.

CHAPTER II
A BRIEF LOOK AT COMTASK

COMTASK: Its History and Purpose

On July 1, 1983, the Office of Vocational and Adult Education, U.S. Department of Education, funded a set of three projects at the University of Tennessee-Knoxville. One of these projects was COMTASK.

The purpose of COMTASK was to develop procedures for gathering current information about jobs and entering that information into a computer database. The information in the database would be able to be retrieved and could be updated. The specific objectives of COMTASK were:

- To provide a basis for up-to-date information about jobs
- To devise a system that will permit input into COMTASK
- To devise a system that includes a quality control function and which permits the updating of job analyses entered into COMTASK
- To devise a system that includes an analysis of the basic tasks required to perform jobs

A group of eleven people representing five different areas provided advice on the design of COMTASK. Members of this group were selected from throughout the United States and were chosen to represent teacher educators, industrial trainers, curriculum developers, commercial publishers, and school personnel. The group was asked to identify possible users and uses of COMTASK and to discuss the input/output formats and types of data that should be collected about each job. Much of what COMTASK has done is based on the advice of this group.

The guidelines for gathering current information about jobs are contained in a companion publication, Procedures for Conducting a Job Analysis: A Manual for the COMTASK Database. The method for gathering information about jobs is called the COMTASK Process. The COMTASK Process, as described in the manual, incorporates several techniques to gather and analyze job information. Methods used by a variety of organizations were compiled into the COMTASK Process. These organizations included

Develop A CurriculUM (DACUM), Vocational-Technical Education Consortium of States (V-TECS), American Telephone and Telegraph (AT&T), Tennessee Valley Authority (TVA), and several branches of the military.

The COMTASK process begins with the selection of a job title and proceeds through a series of 22 steps. The steps consist of questions and activities in which job/task statements and other necessary data are generated. Each step requires you to take some action. Some steps also require a decision. These data are used to develop questionnaires which are administered to people with that job title. Responses are entered and stored in the COMTASK computerized database.

If people are to use the information from the database, they must be able to retrieve it in a form that suits their needs. For this reason, this COMTASK User's Guide has been developed. While efforts were to design a "user-friendly" database, the guide can help a person organize a search and become familiar with some of the information needed to conduct that search.

Information Available

The COMTASK database contains information about jobs. For each job that is listed in the database the following information is available:

- Job title and description
- D.O.T. name, number, and description
- CIP name, number, and description
- Duty list
- Task list
- Equipment list
- Demographic information about workers surveyed and the companies where they work

This list provides the barest outline of the information available. (D.O.T. and CIP information does not always exist, particularly for newly created jobs.) It is possible to restrict your search to only one of the above items or to expand your search to include combinations of items. Often it is possible to get comprehensive lists for more than one job.

Perhaps one can get a better idea of the types of information that can be retrieved from COMTASK by studying a few examples. In the next several pages are four scenarios. Each scenario begins with a description of a problem that might be brought to COMTASK. Following each problem is a solution that describes the type of COMTASK search that might be conducted and the nature of the information that could be obtained. Keep in mind that these are hypothetical scenarios. They address questions that the database can currently answer, and some that it has the potential to answer.

Scenario 1

Problem:

The management of a major farm machinery plant wishes to automate its design and manufacturing operations by installing a Computer Assisted Design/Computer Assisted Manufacturing (CAD/CAM) system. The management is concerned about retraining present employees to operate the new system and wants to know what additional tasks they will have to perform.

Solution:

A COMTASK search is conducted. A job/task inventory for CAD/CAM operators is located. The inventory includes a list of duties and tasks performed by CAD/CAM operators. The computer compares this list of tasks with the tasks performed by current employees to get a list of the new tasks that will be needed. A list of equipment is also provided as well as the percentage of people surveyed who use each piece of equipment, and the percentage of people who perform each task.

The training division of the plant is now able to develop a training program based on information received from COMTASK. The trainers can analyze the new duties and tasks needed and determine the type and length of training period necessary to retrain present employees for the CAD/CAM system.

Scenario 2

Problem:

Office automation systems are dramatically changing the office environment and, consequently, the skills needed by office workers. The business education curriculum committee

at a community college wishes to redesign the curriculum for business education training.

Solution:

COMTASK is searched to determine the available list of duties, tasks, and equipment associated with automated offices. The curriculum committee is able to design new course offerings based on updated information of required tasks and equipment in this area.

Scenario 3

Problem:

A company has experienced many changes in jobs and the nature of certain jobs because of recent technological advances. The company's personnel department believes that job descriptions and performance standards for many positions should be revised and is willing to invest time and resources to conduct a job analysis of certain jobs.

Solution:

COMTASK is searched to see if any job analyses information are available for the jobs in question. Those available are used as a basis for the personnel department to conduct a job analysis. The results of this job analysis are entered into COMTASK as an update of a previous analysis. Job analyses are also conducted for those jobs that were not in COMTASK. Because the personnel department staff followed the procedures outlined in the COMTASK Manual, they were able to enter these results into COMTASK as new information. Once all the job analyses were added to COMTASK, the personnel department retrieved the data in a form that helped them revise the job descriptions.

Scenario 4

Problem:

A publisher's researchers find a need to develop a mathematics book for persons working in CAD/CAM areas. The publisher wishes to supply the author with information that will help the writer develop more realistic problems.

Solution:

COMTASK is searched to obtain a list of all the tasks in CAD/CAM areas that require specific mathematical

knowledge. The results are printed by mathematical topics or specific skills, with the relevant tasks listed under each topic.

[NOTE: COMTASK does not currently contain a list of skills. The system is designed to allow for this increase in capacity.]

Information Needed

The COMTASK database consists of two parts. One part contains a list of duties, tasks, and equipment for each job entered into the database. Tasks are listed under the appropriate duty. Because a duty is a group of related tasks, no task can appear in more than one duty for any one job. Equipment is listed under the job title.

The second part of the COMTASK database contains the results of questionnaires administered to workers. From these results the percentage of workers who performed a certain task or use a certain piece of equipment can be determined.

If COMTASK is to be a viable database it needs the types of information that are in both parts. Lists of duties, tasks, and equipment are needed for more jobs. Generating these lists is time consuming, but the results can be used numerous times.

COMTASK must also have the results from surveys conducted using the above lists. The more questionnaires that are administered, the more representative are the results.

Detailed descriptions for developing a list of duties, tasks, and equipment or for obtaining questionnaires are in the COMTASK Manual.

CHAPTER III
BEGINNING AND ENDING YOUR CONNECTION

Most people are anxious to begin searching a new database. But, there are some procedures that need to be understood before a search is begun. This section will describe the important steps for beginning and ending a search.

Before You Begin

The COMTASK database is designed to present its information in a screen format. A screen is 80 columns wide and 24 lines long. If a screen smaller than this is used you will be unable to see the entire display.

You will also need a modem. It can be either 300 or 1200 baud. Finally, you will need a User I.D. and a password. You can get the User I.D. and password by contacting COMTASK at (XXX) XXX-XXXX or by writing COMTASK. [The U.S. Office of Education chose not to fund COMTASK past this initial development. If funding becomes available, procedures for using COMTASK will be publicized. For information about the current status of COMTASK, contact the Office for Vocational and Adult Education, U.S. Department of Education, 7th & D Streets, SW, ROB 3, Washington, DC 20202.] The staff members at COMTASK will need the name, address, and telephone number of your organization and your name or the name of the person who will be responsible for searching the database. They will also need to know the brand and model number for each type of terminal you plan to use. By return mail you will receive your user I.D., password, and the telephone number of the database.

Planning Your Activity

To conduct a search of COMTASK, or to add information to it, your computer terminal will have to be connected with the COMTASK database. This is done by using a modem and by dialing the telephone number of the database. As soon as this connection is made, you will begin to incur long distance telephone charges. At the present time the only charge for searching COMTASK is the long distance telephone cost. This charge is being made as long as your terminal is connected to COMTASK. To reduce this cost you need to carefully plan your search.

A careful search strategy begins with a thorough study of the information in Chapter four of this COMTASK User's Guide. Here you will get some idea of the types of questions that you will be asked during the search. By studying these questions and planning your responses, you can reduce expenses.

Login Procedures

The procedures for logging in to the COMTASK database are as follows:

- Turn on your terminal, modem, printer, and so forth
- Dial the COMTASK telephone number
- If you are using an accoustic coupler, when you hear a steady high-pitched tone place the telephone receiver into the two rubber seats on the coupler
- When you have reached COMTASK your screen should look like Figure 1. The number to the left of the screen is given as a reference guide for this description.

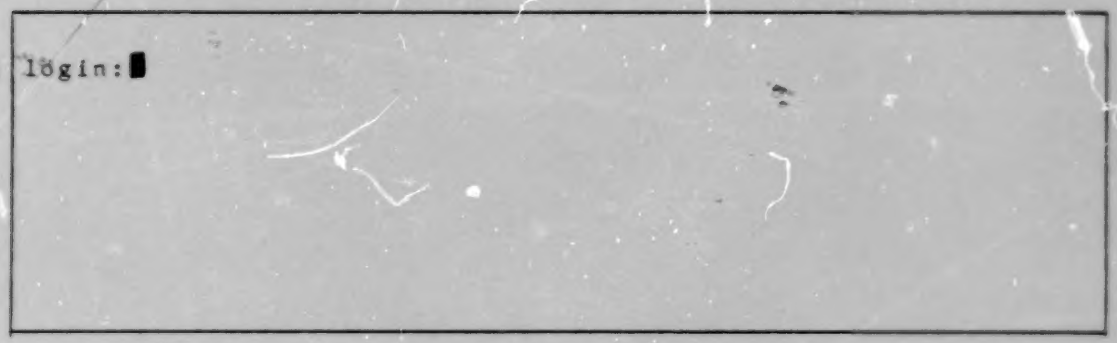

Figure 1

- The cursor is the illuminated rectangle at the end of line 1. Type your User I.D. and PRESS the <RETURN> key on your terminal. In this COMTASK User's Guide the User I.D. is "example." As you can see in Figure 2, the User I.D. is displayed at the end of line 1.

  Any time that a word is enclosed within <> symbols, you should have a key by that name on your terminal keyboard. Here we used <RETURN> and you should see a key with the word "RETURN." If you do not, consult the manual for the terminal to determine which key performs

this function. Some keyboards use the symbol "↰" to indicate "RETURN." Other keyboards may use a different symbol such as CR, Crlf, ↵, or Enter.

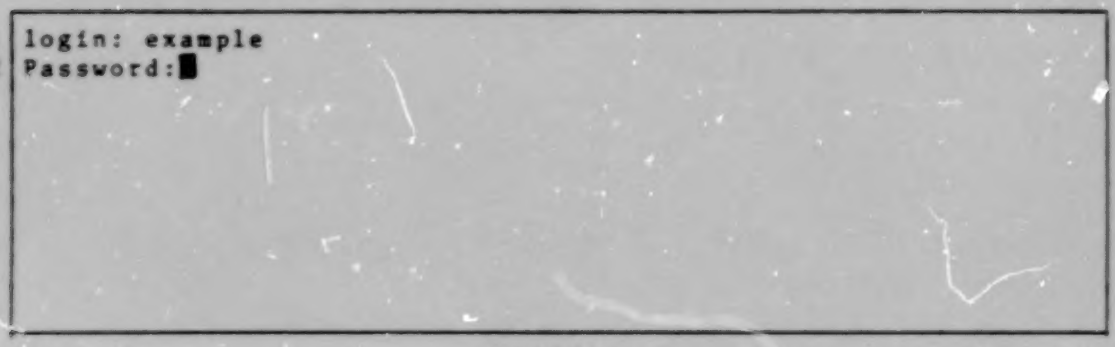

Figure 2

A word of caution is needed. The COMTASK database is "case sensitive." That means you must type in a letter in either upper- or lower-case according to how it is stored in the computer. For instance, if you had typed "Example" for your User I.D., the computer would have rejected it. Also, it would have rejected "EXAMPLE." You must type all entries in the same order of upper and lower case as is stored in the computer. This is true even if your terminal only displays all capital letters.

- Line 2 displays "Password:" with the cursor just after the colon. Type your password. The password will not appear on the screen. PRESS the <RETURN> key. The screen will clear and a new screen similar to the one in Figure 3 will appear.

The screen in Figure 3 has many features that are standard on the remainder of the screens. On line 1 is an abbreviated title of the current screen placed in brackets. In Figure 3, the abbreviated title of the screen is "Bulletin" so on line 1 you should see "[Bulletin]".

Line 2 contains three pieces of information. At the left is the date and time you logged in. At the far right is your User I.D. In the middle is the type of screen that is being displayed. There are two types of screens: MENU and HELP.

Line 3 is blank.

Line 4 contains the complete title of this screen. In Figure 3, the complete title is "COMTASK DATABASE BULLETIN BOARD."

The remainder of the menu screen is divided into three sections. The top section is the narrative; the middle section presents your options; and the bottom section is where you indicate your choice. The three sections are marked in Figure 3.

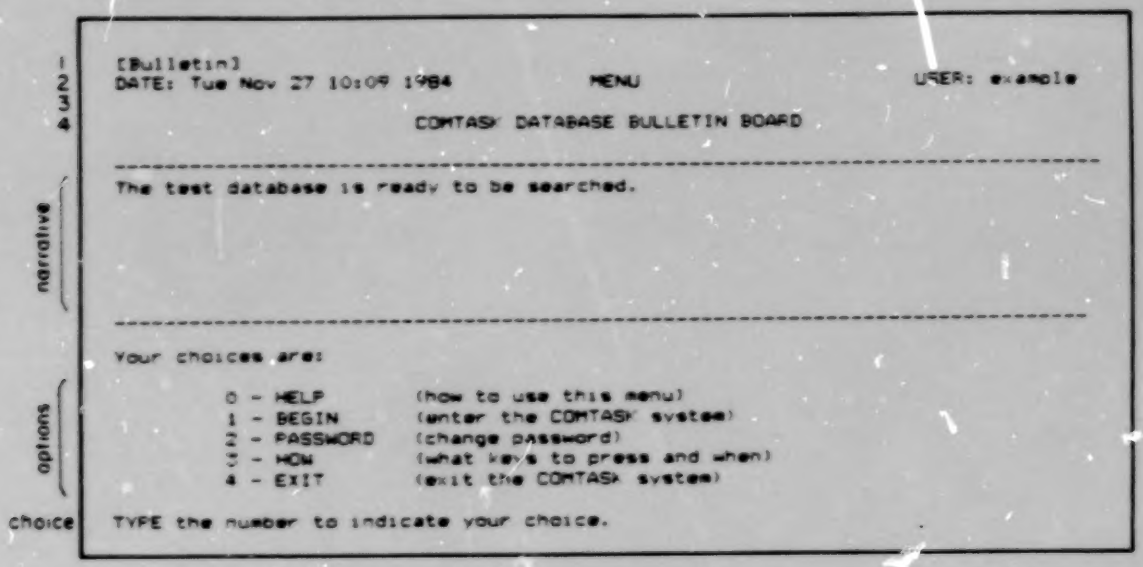

Figure 3

Look at the option section. It begins with the phrase "Your choices are" and then lists five choices. Of interest here are the three choices: PASSWORD, HOW, and EXIT.

It is a good idea to change your password at least once a month. In particular, it should be changed the first time you search the database. To change the password press the "2" key. The terminal will display the message in Figure 4, skip a line, and then print the line "Changing password for (User I.D.)." This line has been labeled with a "1". In Figure 4, the User I.D. is "example" so line 1 ends in the word example. Line 2 displays "Old password:" Type in your current password and press the <RETURN> key. As before, the password will not show on the screen.

When you press the <RETURN> key, line 3 will display "New password:." Type in the new password. A password must be from 5-8 characters long and one of the characters must be a letter. The password cannot contain any spaces. After you have typed in your password press <RETURN>. On line 4 will appear the phrase "Retype new password:" and you should retype your new password in order to verify your first entry. After you press <RETURN> you will receive the message "Press <RETURN> to continue." When you press <RETURN> you will return to the [Bulletin] menu.

If you did not make any mistakes you have changed your password and will have to use the new password the next time you login. If you did make a mistake, the computer will display "Mismatch - password unchanged." on the screen and ask you to return to the bulletin board. Your old password will still be in effect.

```
First you will be prompted to enter your old password.
PRESS <return> when you have typed this in.
Then you will be prompted to enter a new password.
Passwords must be 5-8 alpha-numeric characters in length
and at least one of these characters must be alphabetic.
PRESS <return> when you have typed the new password in.
You will then have to enter the new password again for
verification.

 Proceed:

1 Changing password for example
2 Old password:
3 New password:
4 Retype new password:
```

Figure 4

Option 3, HOW, describes five conventions for using the keyboard. These are discussed at the appropriate places in the User's Guide.

Logout Procedures

The last choice in the option section of all menus provides the opportunity to exit the COMTASK system. There are two methods you can use to leave COMTASK -- a long and a short method. The long method will be explained first. Whenever you want to use the long method to exit COMTASK press the last number in the option section. On this menu it is labeled EXIT. On most menus it is labeled MAIN and you will go to the [Main] menu where you will select the last option which is labeled EXIT. (The [Main] menu will be discussed further in Chapter four.)

In Figure 5 you see the [Exit] menu. To logout from COMTASK you need to perform the following three steps:

- Reach the [Exit] Menu. This is done directly by selecting the EXIT option from either the [Bulletin] or [Main] menus. It is done indirectly by selecting the MAIN option from any other menu and then selecting the EXIT option.

- Type the letter Q. You can type either a capital Q or a lower case q.

- Hang up your telephone when you see "login:" on the screen. Remember that, until you hang up your telephone, you will have to pay long distance telephone charges.

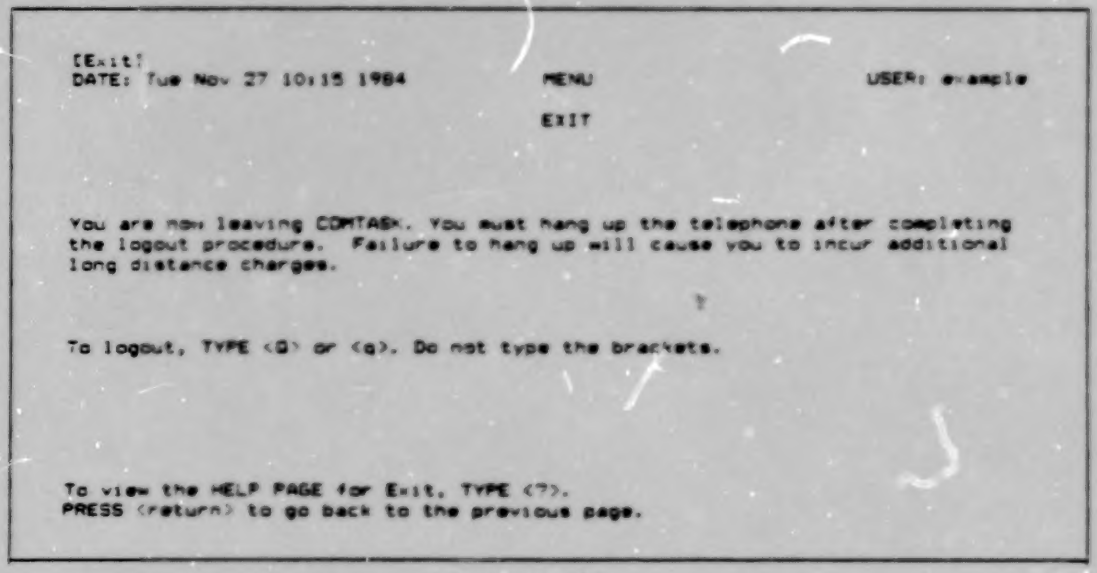
[Exit]
DATE: Tue Nov 27 10:15 1984
MENU
EXIT
USER: example
You are now leaving COMTASK. You must hang up the telephone after completing the logout procedure. Failure to hang up will cause you to incur additional long distance charges.
To logout, TYPE <Q> or <q>. Do not type the brackets.
To view the HELP PAGE for Exit, TYPE <?>.
PRESS <return> to go back to the previous page.

Figure 5

The short method for exiting COMTASK allows you to type a "Q" or "q" and press <RETURN>. As soon as you press <RETURN> you are logged out. You will not be reminded to hang up the telephone, but long distance charges will continue until the telephone is hung up.

You should now be able to login and logout of the COMTASK database. In the next chapter we will discuss some strategies for searching the database.

CHAPTER IV
SEARCH TECHNIQUES

In the last chapter you learned how to login and logout of the COMTASK database. This chapter includes the approach or strategy that should be used to search the database.

A search of COMTASK begins after the login has been completed and when the [Bulletin] menu is on the screen. In the last chapter, several parts of the [Bulletin] menu were discussed. The narrative section was not discussed. The narrative section of this menu is between the two dotted lines and serves as the bulletin board for COMTASK. The bulletin board contains announcements that COMTASK users need to know. For example, the bulletin board will list the latest job titles that have been added to COMTASK, it will announce when revisions to the COMTASK User's Guide are available, and it may suggest areas where job analyses need to be conducted.

In the option section of the [Bulletin] menu are five choices. The last three, PASSWORD, HOW, and EXIT, were discussed in the last chapter. The first option, HELP, will be discussed in Chapter VI. That leaves only the second option. It is called BEGIN and, as might be expected, it is the option to select in order to start a search of COMTASK.

Selecting the BEGIN option causes the computer to automatically branch to the [Main] menu. This menu is shown in Figure 6. In this particular menu there are five options numbered 0-4. As is true with all menus, option 0 (zero) should be selected if you need some help or clarification with that particular menu. Option 4, the last option, is the one that should be used to leave or exit the database.

Option 3 is a MAIL option. Use this choice if you want to leave a message for the COMTASK staff. You might want to suggest that a particular job be added to the database or have some suggestions for improving the database. Whatever your message, this is an electronic mailbox that allows messages to be sent to COMTASK. Your message is automatically coded with your User I.D. so that COMTASK can send you any needed reply.

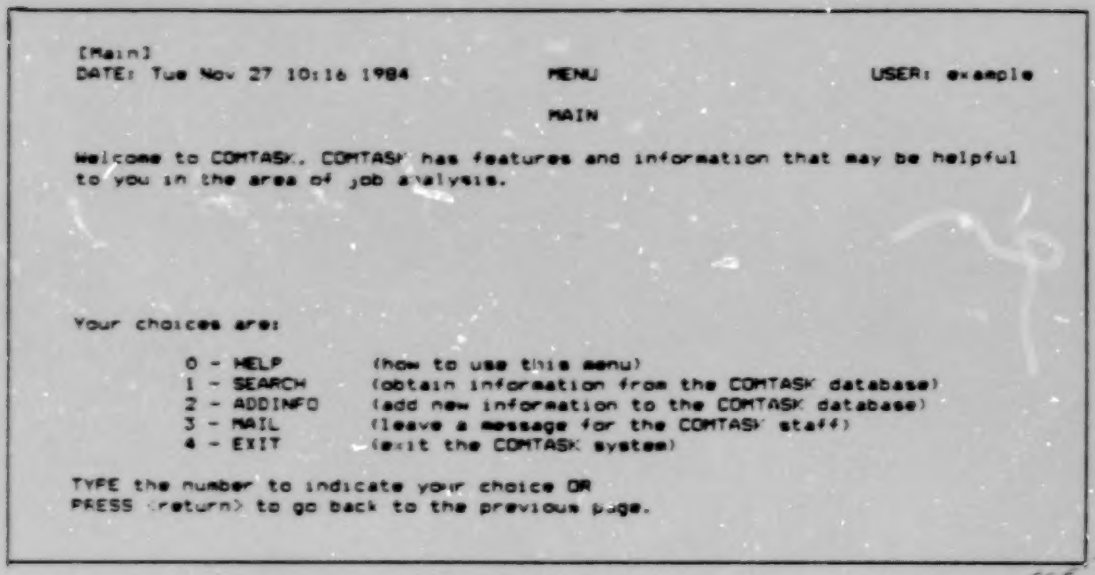
[Main]
DATE: Tue Nov 27 10:16 1984
MENU
MAIN
USER: example
Welcome to COMTASK. COMTASK has features and information that may be helpful to you in the area of job analysis.
Your choices are:
0 - HELP (how to use this menu)
1 - SEARCH (obtain information from the COMTASK database)
2 - ADDINFO (add new information to the COMTASK database)
3 - MAIL (leave a message for the COMTASK staff)
4 - EXIT (exit the COMTASK system)
TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.

Figure 6

The other two options allow you to search or add information to the database. Option 1, SEARCH, is the option you select if you wish to obtain information from COMTASK. Many of the questions that we expect to be asked have been built into the menu system. However, you will also have a chance to request a search of the database along lines that have not been anticipated.

Option 2 is ADDINFO. This is the option you would select if you want to create a job/task inventory for a job that is not in COMTASK. This would consist of typing or keying in all of the duties, tasks, and equipment for the job. You would also select this option when you have administered a set of questionnaires for a job inventory and would like to enter the results into the database. This is an online entry and you will incur long distance telephone charges while these data are being entered. A slower, but less costly, method is to mail the information to COMTASK to enter into the database.

The narrative at this point will follow the menu selection of the COMTASK program. The options for HELP (Option 0) and to leave the system (the "MAIN" or last option) will be omitted from the discussion. Several screens will be presented and discussed. The order in which the screens are presented is not necessarily the same as the order you would see them on the computer. Appendix A contains a tree diagram that shows the options at each level and where each option branches. In all

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cases, the titles used on the tree diagram in Appendix A correspond to the abbreviated titles given in brackets on line 1 of each menu.

Search Menus

The first group of menus we will explore are the Search menus. Discussion of the Addinfo menus is in Chapter V.

Selecting option 2 on the [Main] menu (Figure 6) will result in the [Search] menu being displayed on the screen (Figure 7). The narrative for the [Search] menu describes the types of information that can be obtained from COMTASK. You have two primary choices. Selection of Option 1, TITLES, will provide the opportunity to determine the titles of the jobs that have been listed in COMTASK, their Dictionary of Occupational Titles (D.O.T.) designation, and their Classification of Instructional Programs (CIP) name by taking you to the [Titles] menu.

```
[Search]
DATE: Tue Nov 27 10:16 1984          MENU                    USER: example

                                    SEARCH

COMTASK contains information about jobs. For each job in COMTASK we have:

                .. COMTASK Job Titles and Descriptions
                .. D.O.T. Titles, Codes and Descriptions
                .. CIP Titles, Codes and Descriptions

COMTASK also contains job analysis information and can provide lists and
and statistics on workers surveyed such as:
                .. Job Titles, Duties, Tasks Performed, and Equipment Used
                .. Worker and Employer Demographics
Your choices are:
        0 - HELP        (how to use this menu)
        1 - TITLES      (information about titles in COMTASK)
        2 - ANALYSIS    (job analysis information)
        3 - MAIN        (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 7

The other option on the [Search] menu is called ANALYSIS. Select the ANALYSIS option if you want to find some specific job analysis information.

If the TITLES option is selected you will see the [Titles] menu shown in Figure 8. This menu presents the choices for the different types of job titles that you can get from the database. Option 1 is used to select the COMTASK job titles;

option 2, the D.O.T. titles; and option 3, the CIP titles. Because most searches will be conducted using the COMTASK title, the last two options will also provide output containing the corresponding COMTASK titles.

```
[Titles]
DATE: Tue Nov 27 10:16 1984          MENU                    USER: example

                                TITLES

COMTASK contains the titles and descriptions of each job in the database. It
also contains the corresponding D.O.T. (Dictionary of Occupational Titles)
and CIP (Classification of Instructional Programs) code number, title, and
description for these jobs. Most job searches are conducted using the COMTASK
titles.


Your choices are:

        0 - HELP            (how to use this menu)
        1 - JOB TITLES      (all job titles in COMTASK)
        2 - D.O.T. TITLES   (COMTASK jobs with D.O.T. codes assigned)
        3 - CIP TITLES      (COMTASK jobs with CIP codes assigned)
        4 - MAIN            (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 8

If you selected option 1, JOB TITLES, the [Jobtitles] menu shown in Figure 9 will be displayed. This option allows you to obtain a list of the COMTASK jobs titles that are in the database.

The [Jobtitles] menu presents six options. You can restrict the list of titles: (a) to only the COMTASK titles; (b) to the COMTASK job titles and their corresponding D.O.T. classifications; (c) to the COMTASK job titles and their corresponding CIP designations; and (d) to the COMTASK job titles with both of the corresponding D.O.T. and CIP titles.

Figures 10 displays the [Dottitles] menu you would see if you selected option 2 in the [Titles] menu shown in Figure 8. The selection of option 3 in the [Titles] menu would result in the [Ciptitles] menu; a menu analogous to the [Dottitles] menu. On each menu you have four main options: NUMERICAL, NUMPLUS, ALPHA, and ALPHAPLUS.

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```
[Jobtitles]
DATE: Tue Nov 27 10:17 1984          MENU                    USER: example

                              JOB TITLES

You want a list of the job titles that are in COMTASK.  These will be listed
alphabetically.  You may choose to get each COMTASK job title with its
corresponding D.O.T. title and/or CIP title.



Your choices are:

        0 - HELP          (how to use this menu)
        1 - JOB           (job titles only)
        2 - JOB DOT       (job titles with corresponding D.O.T. titles)
        3 - JOB CIP       (job titles with corresponding CIP titles)
        4 - JOB DOT&CIP   (job titles with both D.O.T. and CIP titles)
        5 - MAIN          (return to MAIN MENU; exit system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 9

```
[Dottitles]
DATE: Tue Nov 27 10:17 1984          MENU                    USER: example

                          D. O. T. TITLES

You want a list of the D.O.T. codes and titles that are in COMTASK.  You can
get this list in numerical order by codes or in alphabetical order by titles.
You can also get each title with its description from the Dictionary of
Occupational Titles (D.O.T.).  The corresponding COMTASK title will be included
with each listing.


Your choices are:

        0 - HELP          (how to use this menu)
        1 - NUMERICAL     (listed in numerical order by D.O.T. code)
        2 - NUMPLUS       (listed numerically with D.O.T. description)
        3 - ALPHA         (listed in alphabetical order by D.O.T. title)
        4 - ALPHAPLUS     (listed alphabetically with D.O.T. description)
        5 - MAIN          (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 10

The NUMERICAL option allows you to obtain each list in numerical order by either the D.O.T. or the CIP code. The D.O.T. code is a 9-digit number and the CIP code is 6 digits. The NUMPLUS option also gives the list in numerical order but adds the accompanying D.O.T. or CIP description.

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The ALPHA and ALPHAPLUS options are analogous to the NUMERICAL and NUMPLUS options. ALPHA provides a list of D.O.T. or CIP titles in alphabetical order; and ALPHAPLUS gives the same list with the addition of the D.O.T. or CIP descriptions.

At the time the [Search] menu was displayed (Figure 7), you were presented with two primary options -- TITLES and ANALYSIS. Subsequently, you followed the results of selecting the TITLES option. We will now explore the results of selecting ANALYSIS.

The [Analysis] menu is displayed in Figure 11. This menu presents four primary options. The JOB SPEC option should be selected if you want to find out about the duties, tasks, and/or equipment used in one or more specific jobs. Selection of this option will lead to later requests to determine if you want information about only duties, tasks, equipment, or about all three.

```
[Analysis]
DATE: Tue Nov 27 10:18 1984          MENU                    USER: example

                                ANALYSIS

JOB SPEC will allow you to determine the duties, tasks, and/or equipment for
one or more specific jobs.  TASK SPEC will allow you to determine the jobs,
duties, and/or equipment for a specific task. EQUIP SPEC will allow you to
determine the jobs, duties, and/or tasks for which a specific piece of
equipment is used.  CIP SPEC will provide you with the jobs, duties, tasks,
and/or equipment for a specific CIP.  Additional questions will help refine
your request.

Your choices are:
        0 - HELP          (how to use this menu)
        1 - JOB SPEC      (information about 1 or more specific jobs)
        2 - TASK SPEC     (information about a specific task)
        3 - EQUIP SPEC    (information about a specific piece of equipment)
        4 - CIP SPEC      (information about a specific CIP)
        5 - MAIN          (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 11

The TASK SPEC option focuses on your choices if you select a specific task. You will be able to determine the jobs, duties, and/or equipment for one task.

EQUIP SPEC is analogous to the TASK SPEC option. This allows you to determine the jobs, duties, and/or tasks that use a given piece of equipment.

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The last option is CIP SPEC and will give you the choice of getting information about the jobs, duties, tasks, or equipment for the entire cluster of jobs in one CIP.

The [Jobspec] menu (Figure 12) is different from the [Taskspec], [Equipspec], and [Cipspec] menus. In [Jobspec] you can request information about one or more jobs. On the other three menus you are restricted to one task, one piece of equipment, or one CIP category. This is an important difference and affords more flexibility to the user who selects [Jobspec]. The important point to consider in this menu is whether the primary type of information you want is about duties, tasks, equipment, or a combination of all three. The sixth choice -- STATISTICS -- is available to obtain a summary of the demographic information about the workers who responded to the surveys used to collect the data in COMTASK.

```
[Jobspec]
DATE: Tue Nov 27 10:20 1984          MENU                    USER: example

                                JOB SPECIFIC

Below are the selections provided by COMTASK for one or more job titles.  When
you select your option, you will be prompted to more clearly define the type
of information you want.


Your choices are:

        0 - HELP        (how to use this menu)
        1 - DUTIES      (duties for one or more jobs)
        2 - TASKS       (tasks for one or more jobs)
        3 - EQUIPMENT   (equipment for one or more jobs)
        4 - CIPDOT      (CIP or D.O.T titles for a specific job)
        5 - COMPLETE    (duties, tasks, and equipment for a specific job)
        6 - STATISTICS  (a statistical summary of workers in a specific job)
        7 - MAIN        (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 12

An alternative menu is the [Taskspec] menu shown in Figure 13. The four primary options available depend on the searcher wanting to determine some information about a particular task. All of these choices require that the name of the task is known. You would select JOB TASK if you wanted a list of all the jobs, in COMTASK, where this given task is performed. Similarly, the EQUIP TASK choice should be selected if you want to obtain a list of all the equipment used to perform the specified task. The last option, JOB&EQUIP, is a combination of the first and third options and allows you to get a list of both the job titles in COMTASK where a task is performed and the equipment that is used in that task.

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```
[Taskspec]
DATE: Tue Nov 27 10:21 1984          MENU                    USER: example

                              TASK SPECIFIC

There are four general kinds of information you can get about a specific task:
(1) a list of jobs where the task appears; (2) a list of duties in which the
task appears; (3) a list of equipment used in a specific task; (4) a list of
jobs and equipment for a specific task.  The starred choices reflect data
reported by workers surveyed for COMTASK.


Your choices are:

        0 - HELP          (how to use this menu)
        1 - JOB TASK      (a list of jobs where a given task is performed)
        2 - DUTY TASK     (a list of duties where a given task is performed)
        3 - EQUIP TASK*   (a list of equipment used in a given task)
        4 - JOB&EQUIP *   (a list of job titles and equipment for a given task)
        5 - MAIN          (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 13

Figure 14 shows the [Equipspec] menu. The four primary options are similar to those available on the last menu, [Taskspec]. For a specific piece of equipment, which you will later name, you can obtain a list of the tasks, duties, or jobs where that equipment is used or a combination that includes both the jobs and the tasks.

```
[Equipspec]
DATE: Tue Nov 27 10:22 1984          MENU                    USER: example

                            EQUIPMENT SPECIFIC

There are four general kinds of information you can get about the use of a
specific piece of equipment: (1) a list of jobs in which it is used: (2) a list
of duties in which it is used; (3) a list of tasks in which it is used; (4) a
combination of both jobs and tasks.  The starred choices reflect data reported
by workers surveyed by COMTASK.

Your choices are:

        0 - HELP          (how to use this menu)
        1 - JOB EQUIP     (job listing where a given piece of equipment is used)
        2 - DUTY EQUIP*   (duty listing where a given piece of equipment is used)
        3 - TASK EQUIP*   (task listing where a given piece of equipment is used)
        4 - JOBTASKEQ *   (choices for jobs and tasks where a given piece of
                           equipment is used)
        5 - MAIN          (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 14

The list of tasks where a specific piece of equipment is used reflects only information gathered from the survey of workers. You must consider the number of workers surveyed when considering the validity of this information.

If you select option 4 on the [Equipspec] menu you will be directed to the [JobTaskeq] menu shown in Figure 15. By selecting this option, you indicated that you want a list that includes both the jobs and the tasks that require a specific piece of equipment. This menu asks you to indicate which of two ways you want this information organized. The first form, called Form 1 on the menu, gives a list of jobs where the equipment is used. Under each job title is a list of the tasks, in that job, that require the use of that piece of equipment. Form 2 organizes the information in almost the reverse order. Each task which requires the use of that equipment is listed and under the task is given the title of each of the jobs where that task uses the equipment. A partial schematic is shown on the [Jobtaskeq] menu and is expanded below.

```
[Jobtaskeq]
DATE: Tue Nov 27 10:22 1984          MENU                    USER: example

                                JOB and TASK

You have indicated that you want a list of both the jobs and the tasks where a
specific piece of equipment is used.  You can get this list in the two forms
shown below:

        FORM 1: Job A                          FORM 2: Task 1
                    Task 1                                 Job A
                    Task 2                                 Job B
                Job B                                  Task 2
                    Task 1                                 Job A
Your choices are:

          0 - HELP        (how to use this menu)
          1 - TASKSBYJOBS (tasks, listed by job, as in FORM 1)
          2 - JOBSBYTASKS (jobs, listed by task, as in FORM 2)
          3 - MAIN        (return to MAIN MENU: exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 15

Suppose that there are three jobs -- A, B, and C -- which use a particular piece of equipment. In Job A, the equipment is used for tasks 1, 2, and 4. Job B requires this equipment for the same tasks (1 and 4) but also for a new task (task 3). Job C requires this equipment for only one task (called task 4 in the other two jobs).

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Schematically, this would be organized in the following way:

Form 1	Form 2
Job A	Task 1
Task 1	Job A
Task 2	Job B
Task 4	Task 2
Job B	Job A
Task 1	Task 3
Task 3	Job B
Task 4	Task 4
Job C	Job A
Task 4	Job B
	Job C

The form you select would depend on your intended use of the information.

The last of the primary options that you might have selected on the [Analysis] menu is called CIP SPEC. You selected this option if you wanted information about a particular group of jobs that form an instruction program accordining to the Classification of Instructional Programs (CIP). The [Cipspec] menu is shown in Figure 16.

```
[Cipspec]
DATE: Tue Nov 27 10:23 1984              MENU                    USER: example

                                  CIP SPECIFIC

The Classification of Instructional Programs (CIP) groups related job titles
into program areas. Your choices include several options for a specific CIP.


Your choices are:

        0 - HELP        (how to use this menu)
        1 - COMPLETE    (a complete list of the jobs, tasks and equipment for
                        one CIP)
        2 - JOB CIP     (a list of all job titles in one CIP)
        3 - DUTY CIP    (a list of all duties in one CIP)
        4 - TASK CIP    (a list of all the tasks in one CIP)
        5 - EQUIP CIP   (a list of all the equipment used in one CIP)
        6 - MAIN        (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 16

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The first of the primary options, COMPLETE, allows you to obtain a list of all of the jobs, duties, tasks, and equipment for one CIP.

Option 2, JOB CIP, allows you to get all of the job titles that are in a particular CIP and are in the COMTASK database. If you had selected the Alpha option on the [Ciptitles] menu you would have obtained a complete list of all the job titles in COMTASK grouped by their CIP title. This option assumes that you know a CIP title or code number and want to get a list that contains the jobs in that program. The primary use of this option will be to verify that you have the correct CIP title or code number.

The third, fourth, and fifth choices -- DUTY CIP, TASK CIP and EQUIP CIP -- allow you to obtain all of the duties, tasks, or equipment, that are included in one CIP.

A Search Example

At this point we have taken you through the first 16 menus. You know how to login and logout. Rather than continue to describe each menu, we will take you down one path to show how a search is conducted. Different search strategies would follow comparable paths.

The search that we will pursue will find an answer to two questions: (1) what tasks are common to the two job titles of Crystal Computer Designer and Electronics Technician; and (2) what tasks are performed by a Crystal Computer Designer that are not performed by an Electronic Technician. The results that will be shown are from a hypothetical database created to test the COMTASK computer program and are for illustrative purposes only.

To answer these two questions we should return to the [Jobspec] menu shown in Figure 12. Both questions will result in a list of tasks and so we would select Option 2, TASKS.

The [Tasks] menu is shown in Figure 17. We want a list of tasks from two different job titles and so select Option 3, 2JOBS. This directs us to the menu [Task2] shown in Figure 18.

At this point you need to have an understanding of three terms that are applied to groups of objects -- union, intersection, and minus. If you do not understand these terms, please refer to Appendix B for a brief explanation.

The first question we want answered asks for the tasks that are common to two jobs. For this, we should select the INTERSECT option. The second question is to determine the tasks that are

```
[Tasks]
DATE: Tue Nov 27 10:23 1984          MENU                    USER: example

                                TASKS

This menu will lead you to information about tasks performed in one or more
specific jobs surveyed by COMTASK.



Your choices are:

        0 - HELP        (how to use this menu)
        1 - 1JOB        (task information from 1 specific job)
        2 - 2JOBS       (task information from 2 specific jobs)
        3 - MORE        (request task information from 3 or more specific jobs)
        4 - MAIN        (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 17

```
[Task2]
DATE: Tue Nov 27 10:24 1984          MENU                    USER: example

                        TASKS FOR TWO JOBS

You want a list of tasks that are performed in two jobs.  We will call them
job A and job B.  You can get a list of those tasks performed in either one or
both of the two jobs (A+B), in both jobs (A and B), or in job A and not in job
B (A-B).



Your choices are:

        0 - HELP        (how to use this menu)
        1 - UNION       (all tasks from two jobs)
        2 - INTERSECT   (only tasks common to two jobs)
        3 - MINUS       (tasks in job A but not in job B)
        4 - MAIN        (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 18

performed in one job but not the other. For this we will need to return to this menu, [Task2], and select the MINUS option.

Selecting the INTERSECT option on the [Task2] menu directs us to the [Tinter] menu shown in Figure 19. Tinter is an abbreviation for Task intersection. We have the option of

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```
[Tinter]
DATE: Tue Nov 27 10:24 1984          MENU                    USER: example

                        TASK INTERSECTION

Common tasks of two jobs are counted or listed from the choices on this menu.




Your choices are:

        0 - HELP        (how to use this menu)
        1 - COUNT       (number of tasks common to job A and job B)
        2 - LIST        (alphabetical list of tasks common to job A and job B)
        3 - MAIN        (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 19

getting the number of tasks in this intersection or of getting a list of these tasks. We are interested in a list of the tasks rather than just the number so we select option 2, LIST.

After you press <2> you get a different type of screen; you are no longer on a menu page but into the actual database. You will return to a menu when the search has been completed. The words "Pausing for Processing. . ." appear and a few seconds later you get the message displayed in Figure 20.

We can now type the name of one of the jobs. The message says that we should type the first 20 letters. We can type less if it will uniquely determine the job name. For example, in the test database there is only one job that begins with Crystal (Crystal Computer Designer) so we can type CRYSTAL and press <RETURN>. In fact, this is the only job title that begins with a C so we could have typed a "C" and pressed <RETURN>.

The computer now asks us to enter the name of the second job title. We want Electronics Technician so we type ELECTRONICS and press <RETURN>. After several seconds, the screen displays the message shown in Figure 21.

It says that there are no tasks common to the above jobs. Is this true or have we made a mistake? Look at the name of the two jobs. Job 1, for which we entered "CRYSTAL," is listed as Crystal Computer Designer. That is the correct job title. Job 2, for which we entered "ELECTRONICS," is listed as ELECTRONICS

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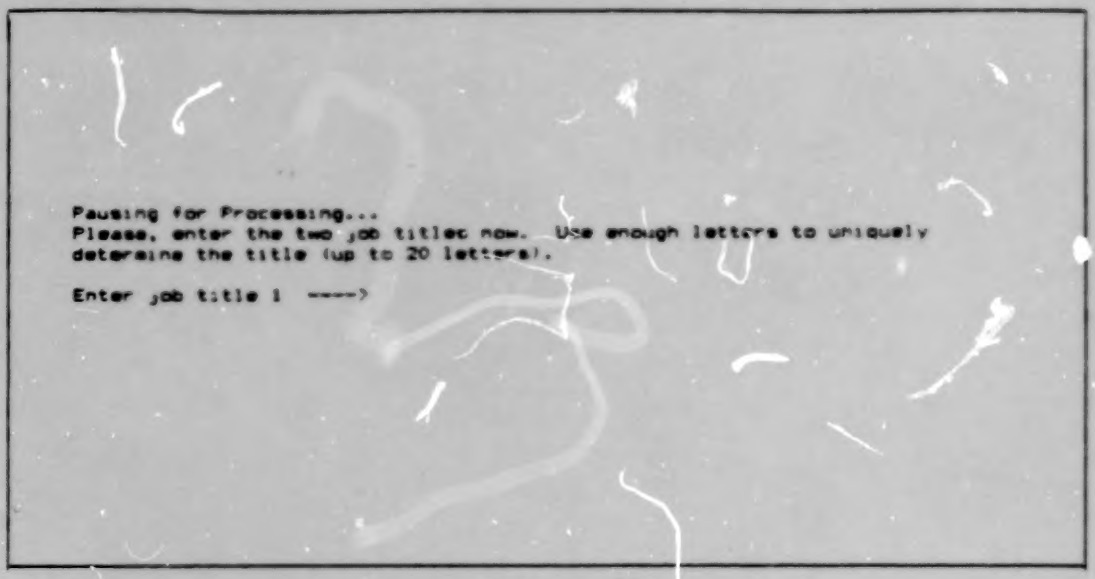
Pausing for Processing...
Please, enter the two job titles now. Use enough letters to uniquely
determine the title (up to 20 letters).
Enter job title 1 ---->

Figure 20

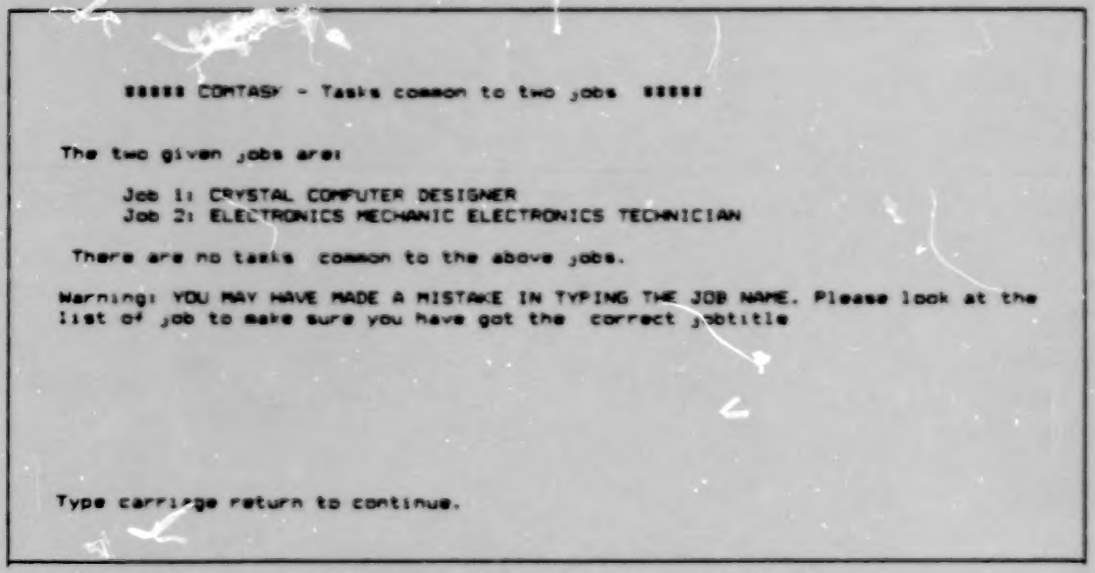
***** CONTASK - Tasks common to two jobs *****
The two given jobs are:
Job 1: CRYSTAL COMPUTER DESIGNER
Job 2: ELECTRONICS MECHANIC ELECTRONICS TECHNICIAN
There are no tasks common to the above jobs.
Warning: YOU MAY HAVE MADE A MISTAKE IN TYPING THE JOB NAME. Please look at the
list of job to make sure you have got the correct jobtitle
Type carriage return to continue.

Figure 21

MECHANIC ELECTRONICS TECHNICIAN. This is not what we wanted. The database contains two job titles that begin with Electronics. If we are going to uniquely determine the job title we must give a more detailed title.

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We press <RETURN> and are sent back to the [Tinter] menu. Again we press <2> and, when we are asked to type the job titles we type "CRYSTAL" for the first job and "ELECTRONICS T" for the second job as shown in Figure 22.

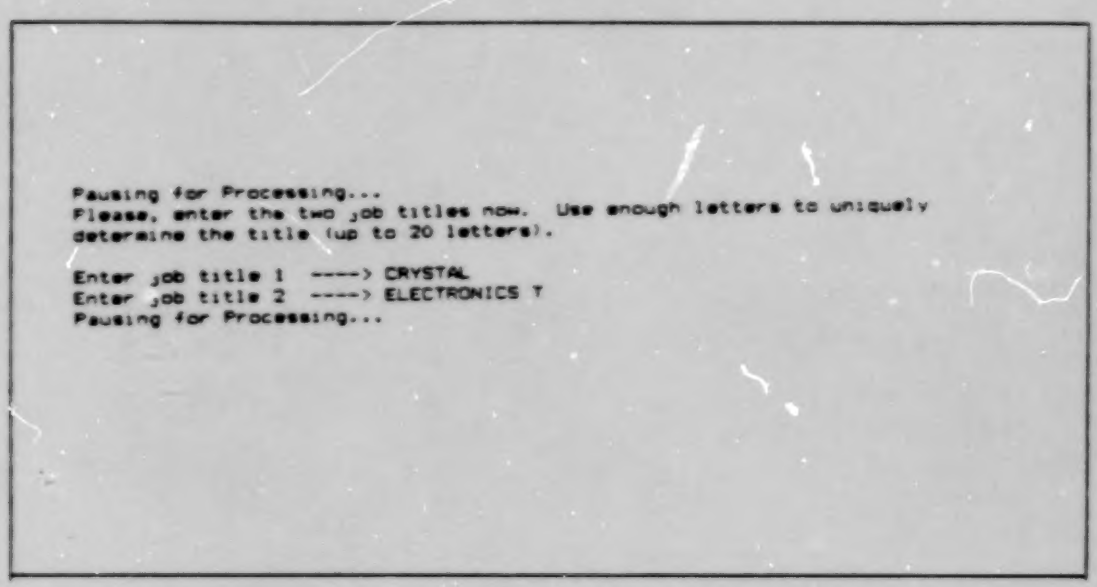
Pausing for Processing...
Please, enter the two job titles now. Use enough letters to uniquely
determine the title (up to 20 letters).
Enter job title 1 -----> CRYSTAL
Enter job title 2 -----> ELECTRONICS T
Pausing for Processing...

Figure 22

This time we get the desired results. There is only one task that is performed in both of these jobs. That task, Perform corrosive test, is shown in Figure 23.

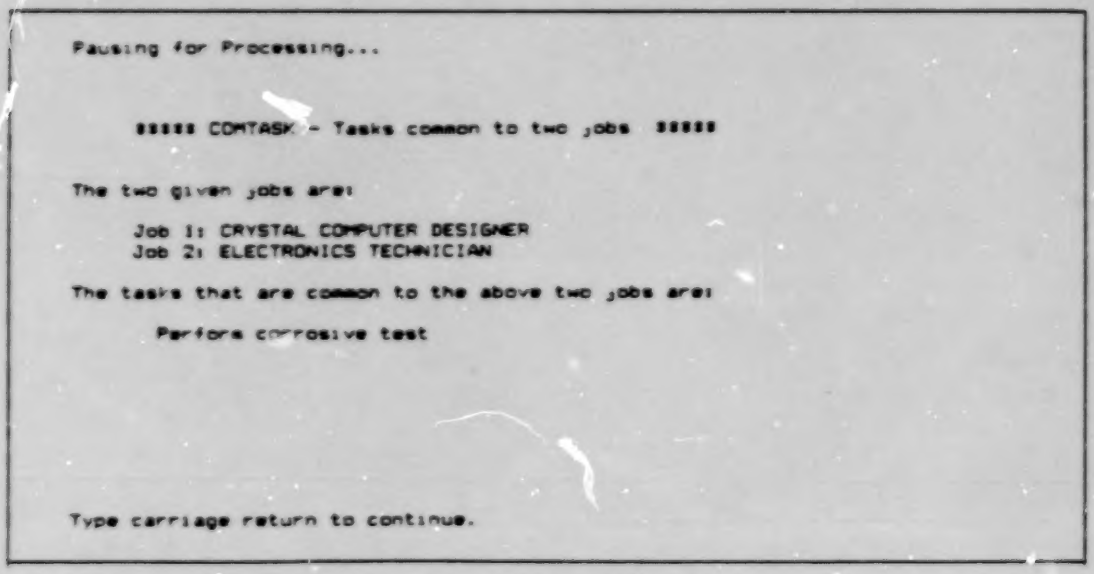
Pausing for Processing...
***** COMTASK - Tasks common to two jobs *****
The two given jobs are:
Job 1: CRYSTAL COMPUTER DESIGNER
Job 2: ELECTRONICS TECHNICIAN
The tasks that are common to the above two jobs are:
Perform corrosive test
Type carriage return to continue.

Figure 23

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The second question we want answered asks for the tasks performed by a Crystal Computer Designer that are not performed by an Electronics Technician. To pursue this we will return to the [Task2] menu shown in Figure 18 by typing Task2 and PRESSing <return>. This time the question you want answered calls for the MINUS option, option 3. When you select the MINUS option you are directed to the [Tminus] menu shown in Figure 24.

```
[Tminus]
DATE: Tue Nov 27 10:30 1984          MENU                    USER: example

                              TASK MINUS

Tasks performed in one job but not in another job are counted or listed from
the choices on this menu.  You may choose the output format for the task list.
You will be asked to provide the titles of the two jobs.  The first job title
you enter should be the job that contains the tasks that interest you.
Additional information is available by selecting HELP, option <0>, or in the
User's Guide under Minus.

Your choices are:

        0 - HELP        (how to use this menu)
        1 - COUNT       (number of tasks in job A and not in job B)
        2 - LIST        (alphabetical list of tasks in job A and not in job B)
        3 - LIST/DUTY   (list of tasks within duty groups in job A and not)
                         in job B)
        4 - MAIN        (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 24

The [Tminus] menu presents you with three primary choices. As with [Tinter] you can get a count of the number of tasks. This does not answer our question. We want a list of the actual tasks. We can get this in two versions. The first version will be similar, in format, to the list we got in response to our first question. The second version will group this information under the appropriate duties. We want our information grouped so we select option 3, LIST/DUTY.

Again, we are asked to enter the titles of the jobs. The order in which these names are entered is important (see Appendix B for a discussion of the minus operation). We want a list of the tasks performed by a Crystal Computer Designer that are <u>not</u> performed by an Electronics Technician. For job 1 we enter "CRYSTAL"; for job 2 we enter "ELECTRONICS T." The results are displayed in Figures 25 and 26.

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```
Pausing for Processing...


$$$$$ COMTASK - Duty, Tasks that are in Job 1 and not in Job 2  $$$$$


The two given jobs are:

     Job 1: CRYSTAL COMPUTER DESIGNER
     Job 2: ELECTRONICS TECHNICIAN

The tasks that  come under Job 1 and not Job 2, grouped by duty are:

       Duty :Performing laboratory tests of optical transmitting devices

       Layout architectural design for optical testing
       Perform corrosive test
       Perform molecular beam epitaxy
       Setup sound compelling tests

       Duty :Researching theoretical engineering concepts

Type carriage return to continue.
```

Figure 25

```
$$$$$ COMTASK - Duty, Tasks that are in Job 1 and not in Job 2  $$$$$


       Demonstrate optical switches
       Filter optical signal/noise
       Test optical computer power in parallel processing









Type carriage return to continue.
```

Figure 26

This completes our discussion of the search procedures for COMTASK. The next section tells how you can accelerate the search process. Help menus are discussed in Chapter six. The next chapter will show how you can add information to the database.

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Quick Search

The COMTASK program has been designed to allow for a quick search strategy. This strategy will mostly be used by people who have experience in searching COMTASK. They have followed the menu system enough to know which menu they need to answer a particular search question.

To go directly to a particular menu, type the abbreviated title of the menu and press <RETURN> instead of typing the number of your choice. You can get a list of all menus in COMTASK by typing ?index and pressing <RETURN>.

For example, if you are at the [Bulletin] menu and you want to go to the [Dunion] menu, you would type Dunion and PRESS <RETURN>. You do not type the brackets that appear on the menu. You type the name as it appears but without the brackets (as it is shown on the tree chart in Appendix A).

The computer program is sensitive to capital letters so make sure that you type the menu exactly as it appears in Appendix A. For example, you must type Dunion rather than dunion. All menu names are written with the first letter capitalized and the remaining letters in lower case.

CHAPTER V
ADDING INFORMATION

In the last chapter we described how you can search the database to retrieve information. COMTASK has been designed to allow job analysis information to be added to the database. This chapter contains the procedures that should be followed for adding a job/task inventory or the results of questionnaires administered to workers.

There are two types of data that can be added to the database: (a) a job/task inventory; and (b) the results of a conducted survey. Both types occur at specific places in the COMTASK process described in the COMTASK manual. We will assume that anyone using this chapter will be familiar with the COMTASK process.

The first type of data occurs during Step 19, Submit Job/Task Inventory to COMTASK, of the process. At this point a job task inventory has been developed and is ready to be submitted to COMTASK. There are two ways to submit this data. One way is to mail the inventory; the other is to enter the inventory online into the COMTASK computer. If you want to input your job/task inventory directly into COMTASK, you will select the INVENTORY option.

The second type of data to be added to COMTASK occurs later in the COMTASK process, at Step 22, Input Data Into COMTASK. Each job/task inventory serves as a basis for a set of questionnaires that are administered to people working at that job. The results of that survey are entered using the SURVEY option for adding information.

The Beginning

Suppose you want to add some information. When you are at the [Main] menu (Figure 6) you are presented with five options. Four of these, HELP, SEARCH, MAIL, and EXIT, were discussed in the last two chapters. In this chapter we will discuss the last of these options, ADDINFO.

You want to add information to COMTASK. Select option 2, ADDINFO on the [Main] menu by pressing the <2> key. This directs you to the [Addinfo] menu shown in Figure 27.

The [Addinfo] menu has four options. Two of them are the HELP and MAIN options found on most menus. The other two are INVENTORY and SURVEY. If you want to add a job/task inventory, then you should select the INVENTORY option. If you want to enter the results from completed questionnaires, then you should select the SURVEY option.

```
[Addinfo]
DATE: Tue Nov 27 10:37 1984          MENU                    USER: example

                              ADD INFORMATION

    COMTASK allows you to input your own job/task inventory for a job
    not in COMTASK or to enter questionaire results.  If you want to add
    a job/task inventory that you have compiled then you should select
    INVENTORY.  If you want to enter the results of completed questionaires,
    then you should select SURVEY.



          0 - HELP       (how to use this menu)
          1 - INVENTORY  (add a job/task inventory)
          2 - SURVEY     (add questionaire results)
          3 - MAIN       (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 27

We will look at the results of selecting each option. Because a job/task inventory must be in the database before a survey can be conducted, we will begin with the INVENTORY option. This is also the option you should select if you want to modify an existing job/task inventory.

Adding a Job/Task Inventory

Selection of the INVENTORY option results in the display of the [Inventory] menu shown in Figure 28. You need to decide if this is a new job or an old job: a new job is one for which no job/task inventory exists in the COMTASK database; an old job refers to a job for which a job/task inventory has been entered any time from the previous day to one entered several years ago. For an old job you will be modifying an existing job/task inventory. For a new job you will be entering data for the first time.

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```
[Inventory]
DATE: Tue Nov 27 10:38 1984          MENU                    USER: example

                        INVENTORY  INFORMATION

    The job/task inventory you wish to enter is either for a new job or an
    old job.  A new job is one for which no job/task inventory exists in
    the COMTASK database.  An old job refers to a job for which a job/task
    inventory has been previously entered.  Press <1> NEWJOB if you are
    entering data for the first time.  Press <2> OLDJOB if you are modifying
    an existing job/task inventory.


Your choices are:

        0 - HELP        (how to use this menu)
        1 - NEWJOB      (enter job/task inventory for a new job)
        2 - OLDJOB      (modify an existing job/task inventory)
        3 - MAIN        (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 28

If you do not know whether there is a job/task inventory in COMTASK for your job, then type <Jobtitles> and press <RETURN>. This will direct you to the [Jobtitles] menu where you can get a complete list of all job titles in COMTASK. After you have the list of titles, type <Inventory> and press <RETURN> to get back to the menu shown in Figure 28.

We are going to enter the job/task inventory for the job of word processor. This job title is not in COMTASK, so we select the NEWJOB option and press <1>. The first two lines in Figure 29 are displayed on the screen. Press <RETURN> and the third line is added to the display. After a few seconds, Figure 30 is displayed.

```
Let's get started
Press <return> to continue

working...
```

Figure 29

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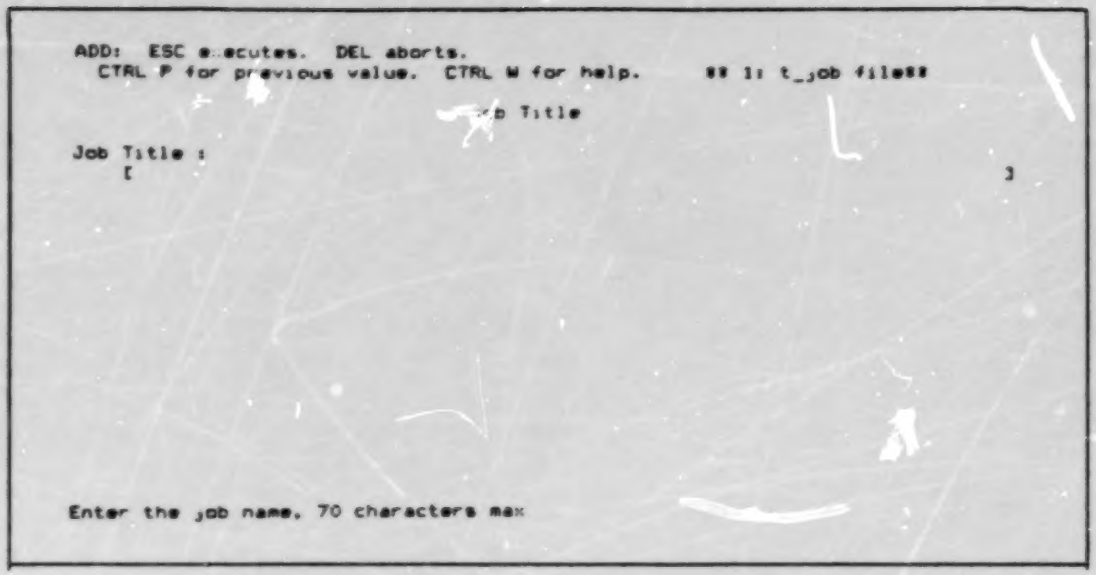
ADD: ESC e..ecutes. DEL aborts.
CTRL P for previous value. CTRL W for help. ** 1: t_job files**
Job Title
Job Title :
[
]
Enter the job name, 70 characters max

Figure 30

Type the title of the job you want to enter. It will appear in all uppercase letters on the screen. At the bottom of the screen are the words "Enter the job name, 70 characters max." This means that the job title can contain a maximum of 70 characters when. When counting characters, remember to count both letters, numerals, spaces, and other symbols. As you type in the job title, in this case the title is WORD PROCESSOR (a total of 14 characters), it is displayed on the screen in uppercase letters as shown in Figure 31.

When you have finished typing the job title, press the <ESC> key. This executes this phase of the program. You will see the message "Program over" on the screen as shown in the first line of Figure 32. Do not worry. This just means that this phase of the program is complete and the program is moving to the next phase.

Before we continue, look at the top two lines of Figure 30. Four typing aides are given, one of which we have already mentioned. The <ESC> key executes the program. The <DEL> or <DELETE> key aborts the program; it should only be used if you want to stop the program and you will lose all the data that you have entered. <CTRL W> (hold down the <CTRL> key and press the <W> key) will provide a list of 16 special keys. For example, <CTRL A> allows you to insert letters and <CTRL X> lets you delete letters.

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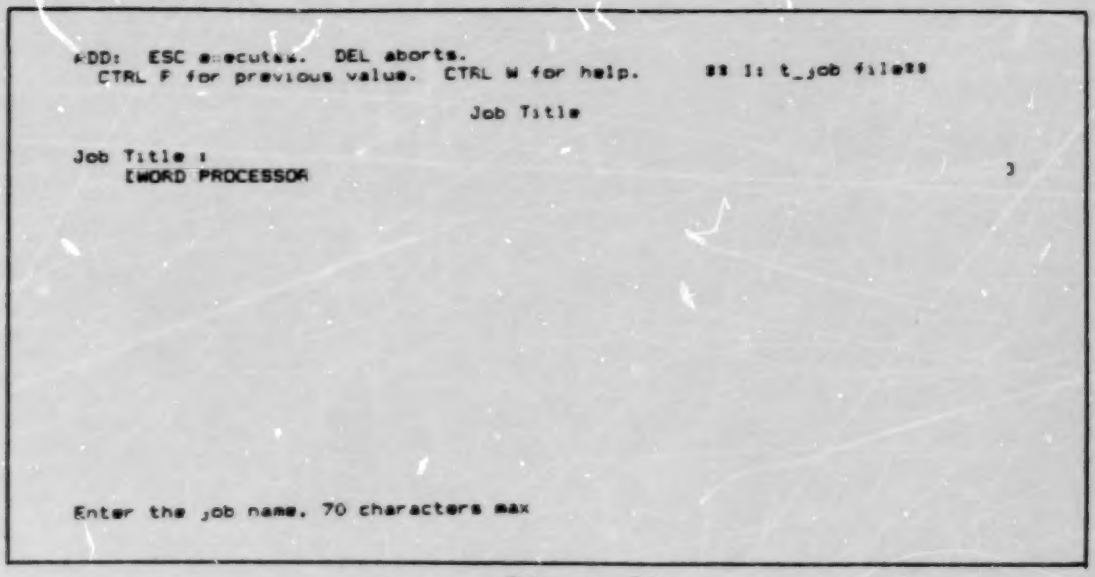
ADD: ESC executes. DEL aborts.
CTRL P for previous value. CTRL W for help. ## 1: t_job file##
Job Title
Job Title :
[WORD PROCESSOR
Enter the job name, 70 characters max

Figure 31

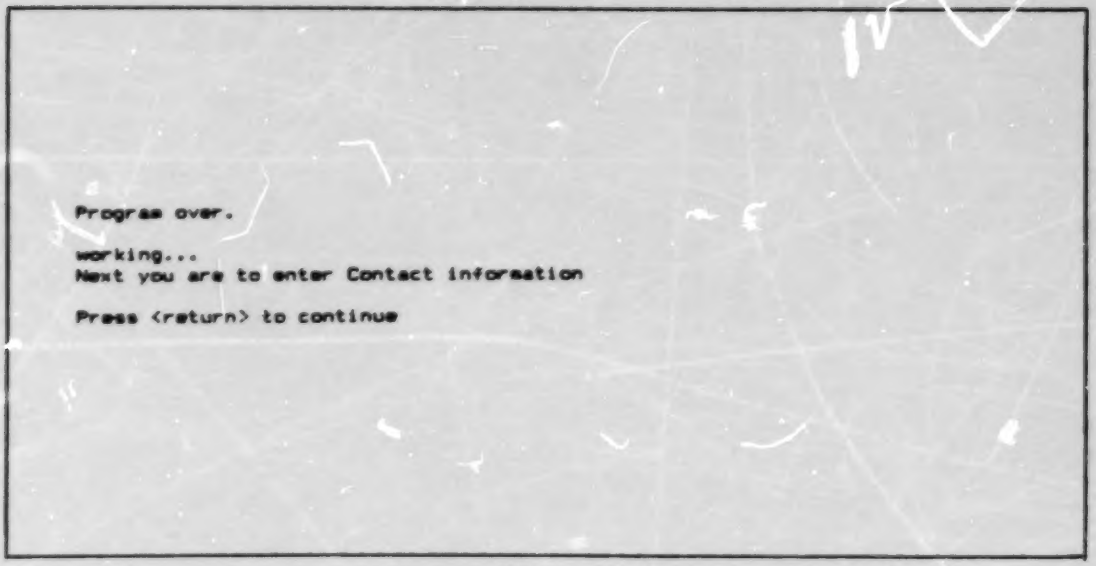

Figure 32

Suppose you had typed WORL PROCESSOR instead of WORD PROCESSOR. By using the arrow or cursor keys <→> or <←> you should position the cursor over the letter L. Type <CTRL X> and the L will disappear. Now type <CTRL A> and then <D> and a D should appear in place of the missing L. We will use these keys more when we modify a job/task inventory.

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We now return to the messages in Figure 32. The display asks us to press <RETURN> in order to continue. We do, and after a few seconds, the display in Figure 33 appears.

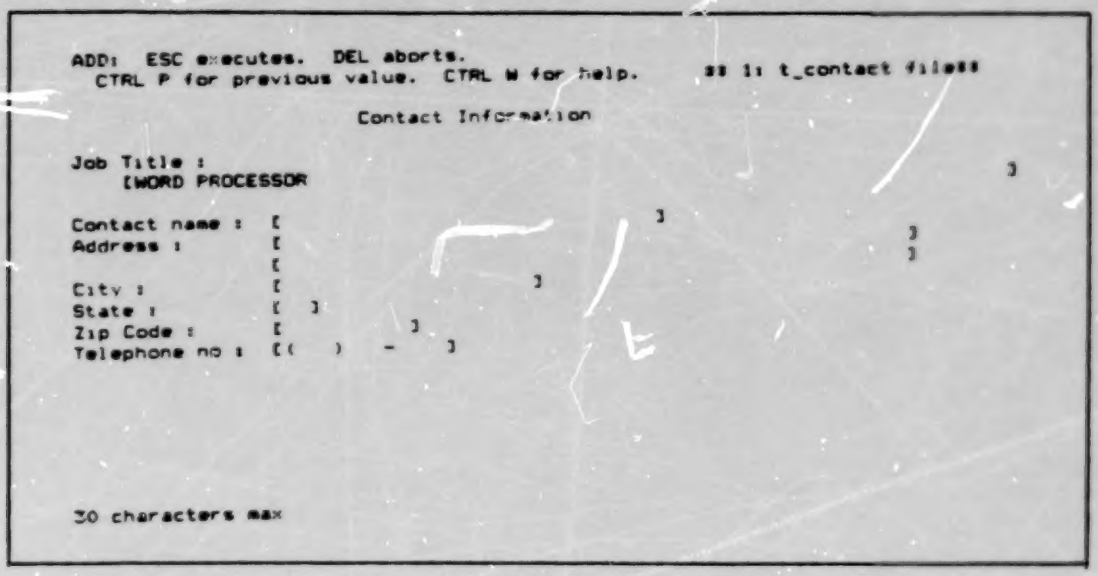

Figure 33

In Figure 33 you are to enter the name of the person that should be contacted if there are any questions by the COMTASK staff about this job/task inventory. Notice that the job title is already filled in. You should enter the appropriate information on each line. Press <RETURN> to end the entry for that line.

In Figure 34 we show a partially completed screen. The telephone number has not been completely entered. You will have to type the parentheses and the hyphens in the telephone number.

When you have completed the contact information, press <ESC>. Again the message "Program over" is displayed to indicate that you have completed the second phase. The display in Figure 35 shows that you are being asked if you have D.O.T. information for this job. If you do, type <y>, if not, type <n>.

We have D.O.T. information for our job. We respond with a <y> and after several seconds see the screen shown in Figure 36. We are to enter the D.O.T. code number, title, and description. The cursor is positioned inside the left bracket of the line

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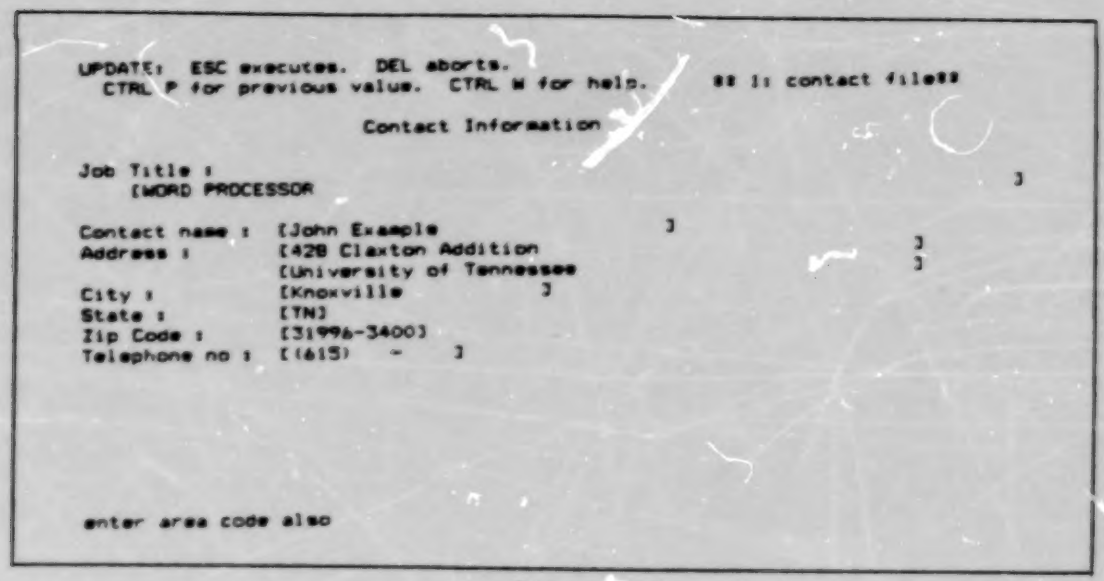
UPDATE: ESC executes. DEL aborts.
CTRL P for previous value. CTRL W for help. ## 1: contact file##
Contact Information
Job Title :
[WORD PROCESSOR
Contact name : [John Example
Address : [428 Claxton Addition
[University of Tennessee
City : [Knoxville
State : [TN]
Zip Code : [37996-3400]
Telephone no : [(615) -]
enter area code also

Figure 34

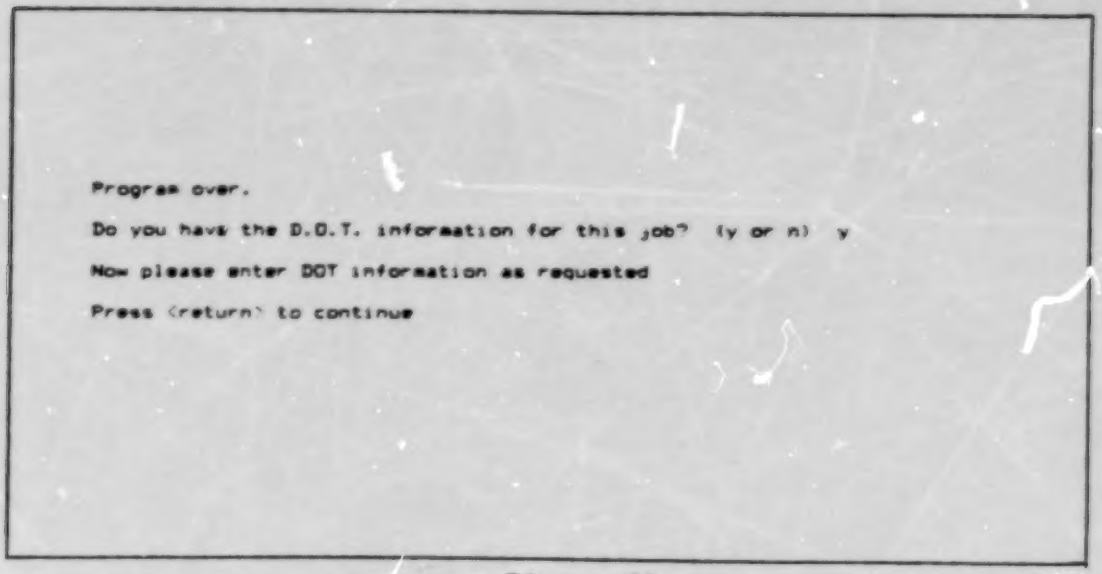
Program over.
Do you have the D.O.T. information for this job? (y or n) y
Now please enter DOT information as requested
Press <return> to continue

Figure 35

labeled "D.O.T. Code:." At the bottom of the screen is the message that this must be in the form ***###.###-###***. You will have to type the period and the hypen. A partially completed entry is shown in Figure 37.

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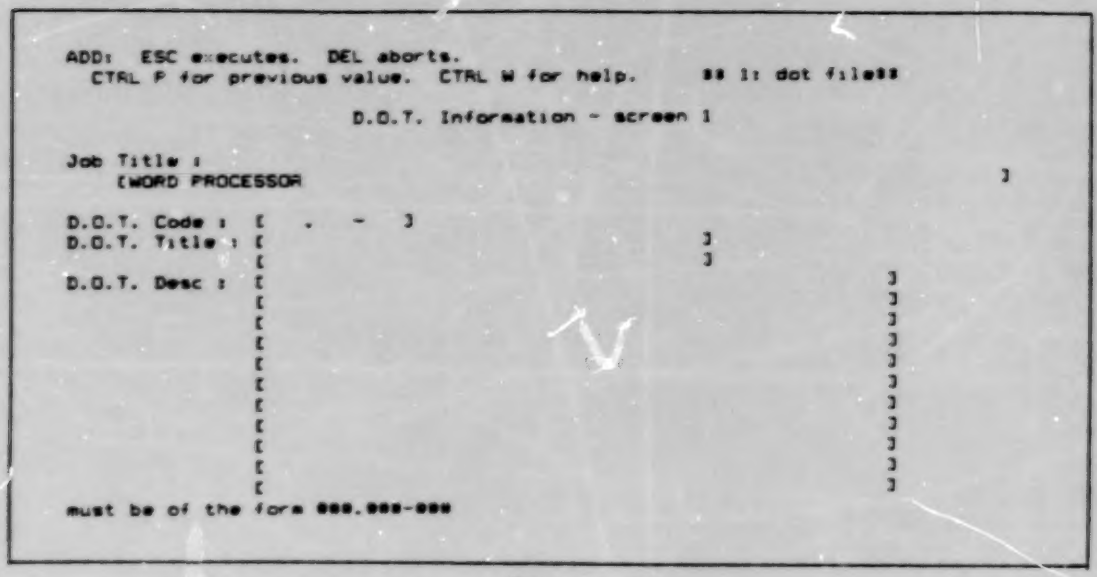
ADD: ESC executes. DEL aborts.
CTRL P for previous value. CTRL W for help. ## 1: dot file##
D.O.T. Information - screen 1
Job Title :
[WORD PROCESSOR
D.O.T. Code : [. -]
D.O.T. Title : [
D.O.T. Desc : [
must be of the form ###.###-###

Figure 36

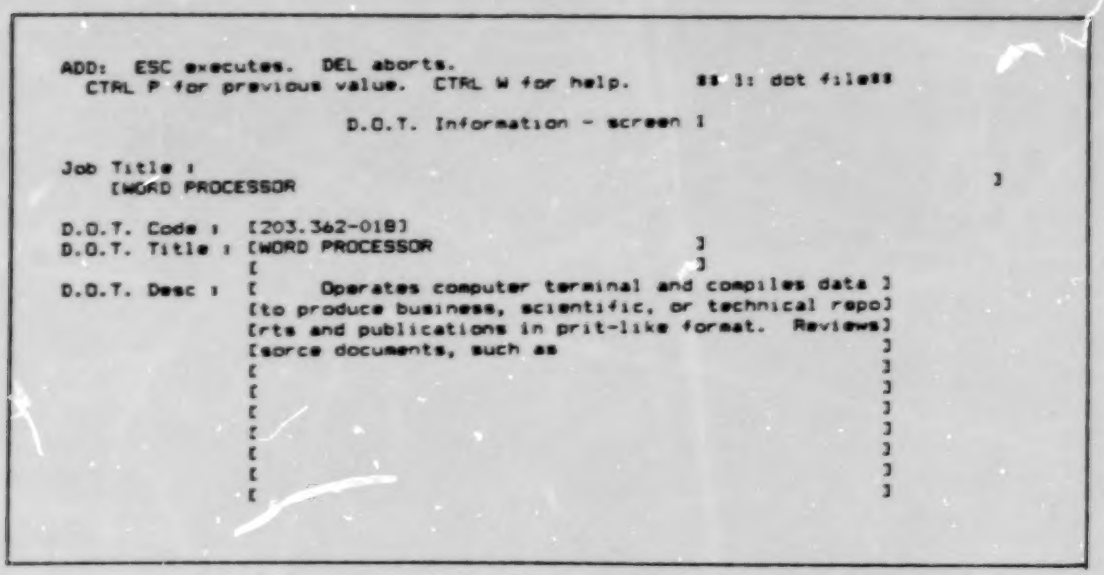
ADD: ESC executes. DEL aborts.
CTRL P for previous value. CTRL W for help. ## 1: dot file##
D.O.T. Information - screen 1
Job Title :
[WORD PROCESSOR
D.O.T. Code : [203.362-018]
D.O.T. Title : [WORD PROCESSOR
D.O.T. Desc : [Operates computer terminal and compiles data
[to produce business, scientific, or technical repo]
[rts and publications in prit-like format. Reviews]
[sorce documents, such as

Figure 37

When you have completed your entry, press <ESC>. If you examine Figure 37 you will notice several typographical errors. All errors should be corrected when they are typed. But, these were not noticed and so they will be corrected by modifying these entries using the OLD JOB option on the [Inventory] menu (Figure 28).

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You now have the option of entering the CIP information. The CIP entry, with typographical errors, is shown in Figure 38.

When the CIP data has been entered, and the <ESC> key has been pressed, you are ready to type in the equipment list. The next three figures indicate how this appears. In Figure 39, the

```
ADD:  ESC executes.  DEL aborts.
  CTRL P for previous value.  CTRL W for help.      ## 1: cip files##

                        CIP Information - screen 1

Job Title :
    [WORD PROCESSOR                                                    ]

CIP Code :      [07.0608]
CIP Title :     [WORD PROCESSING                                       ]
CIP Desc :      [      Word processin is an instructional progras th]
                [at prepares individuals to edit and produce writte]
                [n communication utilizing special-purpose machines]
                [ to correct, format, and print information.  CIP 0]
                [7.0303 is a related instructional progras.         ]
                [                                                   ]
                [                                                   ]
                [                                                   ]
                [                                                   ]
                [                                                   ]
                [                                                   ]
```

Figure 38

```
ADD:  ESC executes.  DEL aborts.
  CTRL P for previous value.  CTRL W for help.      ## 1: equip files##

                          Equipment Information

Job Title :
    [WORD PROCESSOR                                                    ]

Equipment :     [Adding machine                                        ]
Equipment :     [Addressing equipment                                  ]
Equipment :     [Automobile                                            ]
Equipment :     [Binder, spiral                                        ]
Equipment :     [Binder, thermal                                       ]
Equipment :     [Burster, machine                                      ]
Equipment :     [Calculator, nonprogramable                            ]
Equipment :     [Calculator, programable                               ]
Equipment :     [Calculator, ten-digit print/display                   ]
Equipment :     [Cassette player                                       ]
Equipment :     [Checkwriter                                           ]
Equipment :     [Computer, main frame                                  ]
Equipment :     [Computer, micro or personal                           ]
Equipment :     [Collator, automatic                                   ]
50 characters max
```

Figure 39

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first 14 pieces of equipment have been typed. A <RETURN> was pressed at the end of each line. When 14 pieces of equipment have been entered, we press <ESC> and get the message in Figure 40. We have more equipment to enter and so respond with a <y>.

In Figure 41 the equipment list continues to be entered. When we have typed the last piece of equipment, we press <ESC>

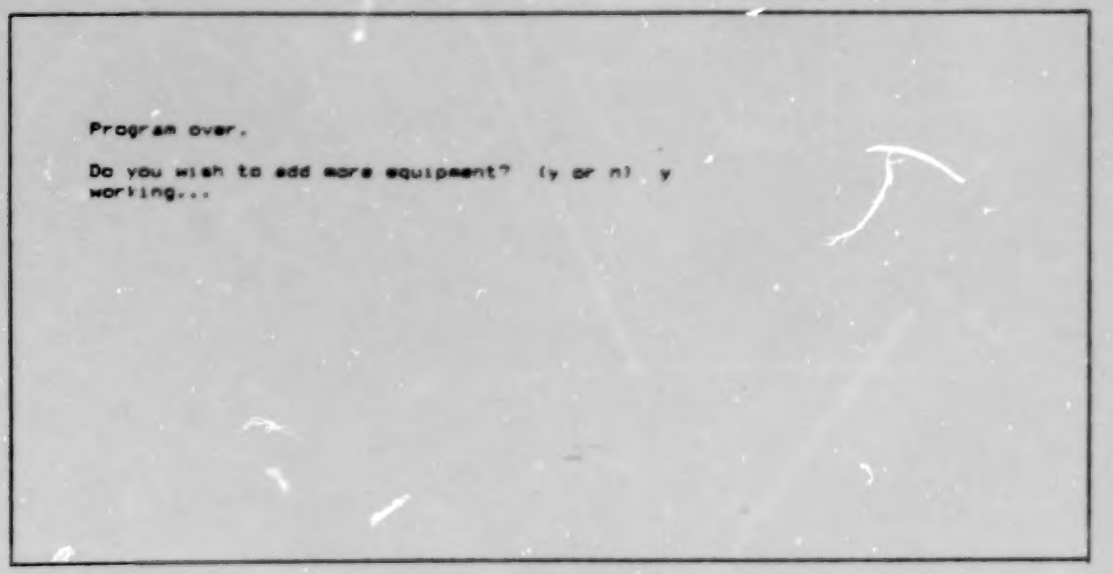

Figure 40

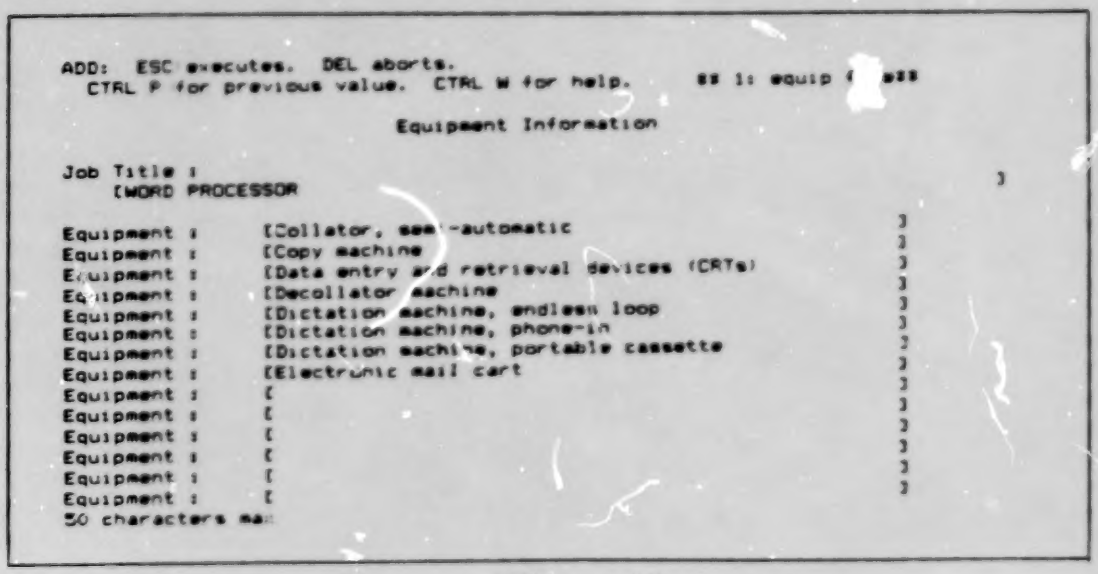
ADD: ESC executes. DEL aborts.
CTRL P for previous value. CTRL W for help.
Equipment Information
Job Title :
[WORD PROCESSOR
Equipment : [Collator, semi-automatic
Equipment : [Copy machine
Equipment : [Data entry and retrieval devices (CRTs)
Equipment : [Decollator machine
Equipment : [Dictation machine, endless loop
Equipment : [Dictation machine, phone-in
Equipment : [Dictation machine, portable cassette
Equipment : [Electronic mail cart
Equipment : [
Equipment : [
Equipment : [
Equipment : [
Equipment : [
Equipment : [
50 characters ma

Figure 41

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and respond with a <n> when we are asked if we have more equipment to enter. We next see the display shown in Figure 42.

Each task is associated with a duty. The message in Figure 42 indicates that you are going to next enter duties and tasks. This will be done one duty at a time. For example, you will be asked for the name of a duty as shown in Figure 43. You type in the name and press <ESC>.

```
Program over.

Do you wish to add more equipment?  (y or n)  n
Next, you may proceed to enter duties and tasks
first, you will be prompted for a dutyname
then, you will be prompted for tasks in that duty
after you are finished with that screen, press the
ESC key, and you will be prompted for subsequent
actions

Press <return> to continue
```

Figure 42

```
ADD:  ESC executes.  DEL aborts.
  CTRL P for previous value.  CTRL W for help.      $$ 1: duty file$$

                              Duty Information

Job Title :
    [WORD PROCESSOR                                                    ]

Duty name :      [Supervising/Training                                  ]
                 [                                                      ]




120 characters max
```

Figure 43

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As before, you get the message "Program over. working. . ." This is shortly followed by the message "Now please enter task names/press <return> to continue." After you press <RETURN> the display shown in Figure 44 comes on the screen.

Notice that the duty title is the one you entered in Figure 43. You now enter each task and press <RETURN> at the end of each entry. After you have entered the sixth task, press <ESC>. You will be asked the question (line two) in Figure 45.

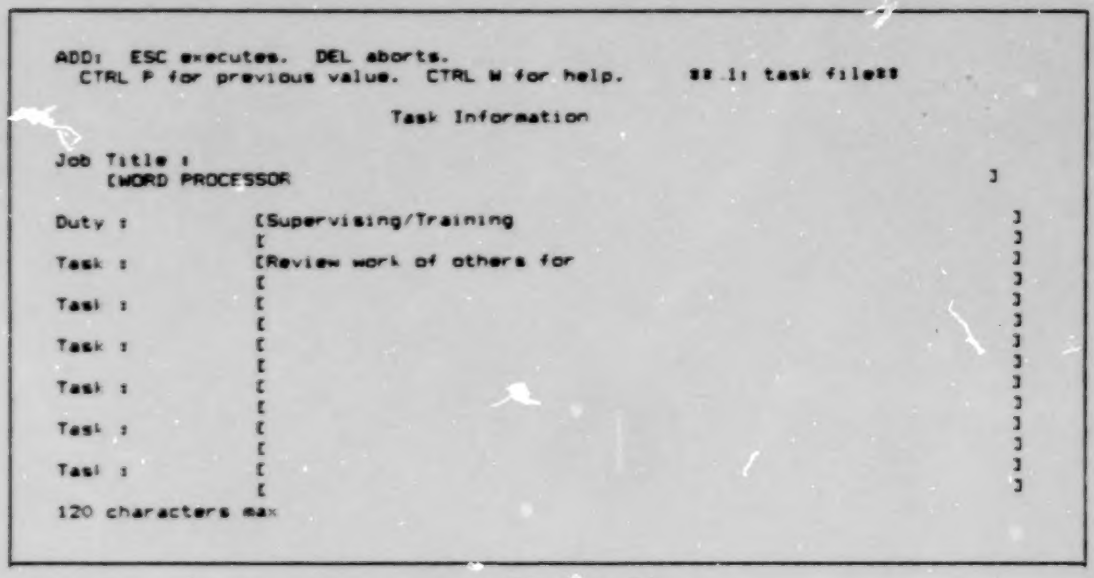

Figure 44

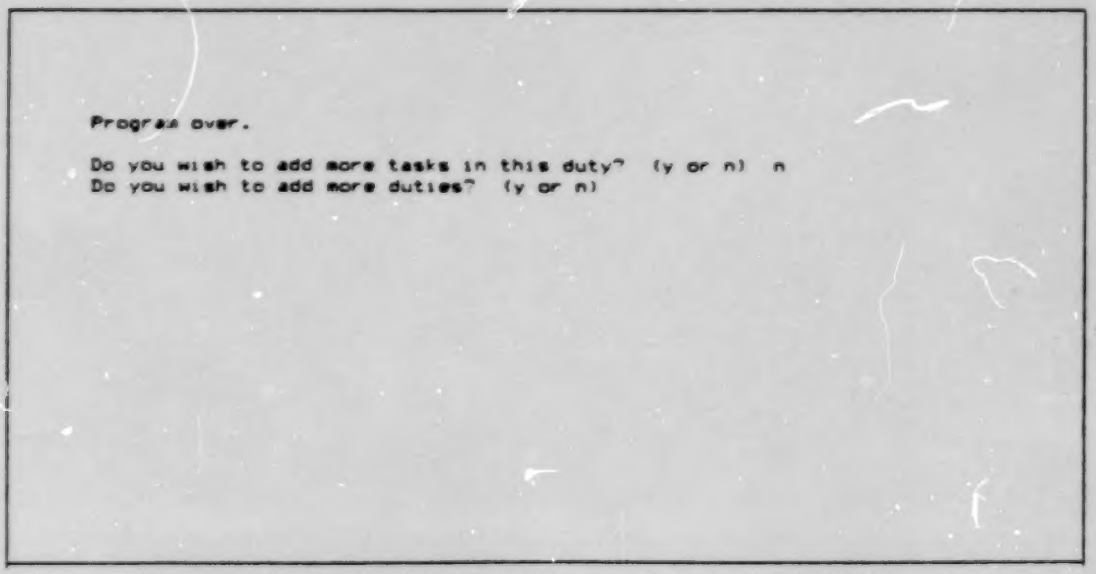

Figure 45

BEST COPY AVAILABLE

If you want to continue to add tasks to this duty, you respond with a <y>. If you respond with a <y>, you will again get the screen shown in Figure 44. When you have entered the last task for the duty, respond with a <n>. A response of <n> will bring the question on line three in Figure 45. A response of <y> indicates that you have more duties to enter. You are shown the screen in Figure 43 and continue to follow the process. When you have entered the last task, you will answer this question with a <n> and be returned to the [Inventory] menu. We are now ready to correct any typographical or other errors we made in the original entry or to add more data.

Modifying a Job/Task Inventory

In order to modify a job/task inventory, we first reach the [Inventory] menu by using the procedures described earlier. The OLD JOB option is selected to get the screen displayed in Figure 46. Notice that you can select the area you want to modify.

Suppose you want to correct the CIP information shown in Figure 38. Press <3> and you will get the first three lines in Figure 47. After you press <RETURN> you get the display in Figure 48.

The CIP description you want to modify is for the job of word processor. Type WORD PROCESSOR and press <ESC>. As usual, you will get the "program over" message shown in Figure 49. Notice that you are then asked if you want to add new information or modify information that currently exists.

```
[Old job]
DATE: Tue Nov 27 11:09 1984          MENU                    USER: example

                          MODIFY AN EXISTING JOB

COMTASK allows you to modify a job/task inventory in the database.  For each
job in COMTASK you may alter any of the following areas of information:
                .. Contact Information
                .. D.O.T. Title, Code, and Description
                .. CIP Title, Code, and Description
                .. Equipment
                .. Duties with Tasks for each Duty
Your choices are:
        0 - HELP        (how to use this menu)
        1 - CONTACT     (to modify contact information)
        2 - D.O.T.      (to modify D.O.T. information)
        3 - CIP         (to modify CIP information)
        4 - EQUIP       (to modify equipment)
        5 - DUTY/TASKS  (to modify duty with tasks)
        6 - MAIN        (return to the MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 46

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```
You will first be prompted for the job name
Enter the job for which you wish to modify the C.I.P. information

Press <return> to continue

working...
```

Figure 47

```
ADD:  ESC executes.  DEL aborts.
  CTRL P for previous value.  CTRL W for help.      ## 1: job file##

                              Job Information

Job Title :
    [WORD PROCESSOR                                                    ]



Enter the jobname. upto 70 characters allowed
```

Figure 48

We want to modify the last entry so we respond with a <m> and, when prompted, press <RETURN>. After a few seconds the previous information we had entered is displayed as shown in Figure 50.

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```
Program over.

Do you wish to add a new C.I.P, or modify the existing information? (a or m) m
Next, you will be shown the information to modify
Make whatever changes you wish, then press the ESC key

Press <return> to continue

working...
```

Figure 49

```
UPDATE:  ESC executes.  DEL aborts.
  CTRL P for previous value.  CTRL W for help.      ## 1: cip file##

                        CIP Information - screen 1

Job Title :
    [WORD PROCESSOR                                                        ]

CIP Code :      [07.0608]
CIP Title :     [WORD PROCESSING                                           ]
CIP Desc :      [     Word processin is an instructional program th]
                [at prepares individuals to edit and produce writte]
                [n communication utilizing special-purpose machines]
                [ to correct, format, and print information.  CIP 0]
                [7.0303 is a related instructional program.         ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
```

Figure 50

The only error that we see is with the second word "processin." This needs a "g" on the end. (Several words are split. For example, the word "that" is split with the "th" at the end of one line and the "at" at the beginning of the next. This is a function of the entry program and is not an error.)

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There are three key-stroke combinations that we can use to edit an entry.

<CTRL X>: Deletes a character

<CTRL A>: Insert or stop inserting characters

<CTRL D>: Clear tc end a line.

We will use the arrow keys to position the cursor in the correct position before we press one of the above combinations. Remember, <CTRL A> means hold down the <CTRL> key and press the <A> key.

The editor program, at the current time, is a line editor. This presents a few problems and causes some additional work but it is better than retyping the entire entry.

Position the cursor where you want to make a change. In this case we position it at the space between "processin" and "is". We want to insert the letter "g". We press <CTRL A> to turn on the insertion feature and type <g>. You will notice that a "g" is placed at the end of the word "processin" and all of the characters are shifted one space to the right. Unfortunately, the "h" at the end of the line is lost (see Figure 51).

```
UPDATE:  ESC executes.  DEL aborts.
  CTRL P for previous value.  CTRL W for help.      ## 1: cip file##

                        CIP Information - screen 1

Job Title :
    [WORD PROCESSOR                                                    ]

CIP Code :      [07.0608]
CIP Title :     [WORD PROCESSING                                       ]
CIP Desc :      [     Word processing is an instructional program t]
                [at prepares individuals to edit and produce written]
                [n communication utilizing special-purpose machines]
                [ to correct, format, and print information.  CIP 0]
                [7.0303 is a related instructional program.         ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]

1700 characters max
```

Figure 51

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We will have to insert the "h" at the beginning of the next line. That, of course, will force the "e" at the end of line two to disappear and it will have to be inserted at the beginning of line three. If a line ends with a space, remember to insert that space at the beginning of the next line.

Deleting a character is a similar process. Position the cursor over the letter to be deleted and press <CTRL X>. To delete all the characters on a line to the right of the cursor, press <CTRL D>.

When you have completed editing the display on the screen, the display should look like that in Figure 52. You can now press <ESC>. You will be asked if you want to correct the next record. Thus, if the CIP description was longer than could be displayed in one screen, we would respond with a "y" for yes. In this case, we have completed editing or modifying the CIP entry and so we respond with an "n" and are returned to the [Oldjob] menu (Figure 46). If you have corrections to any of the other entries such as the equipment list or perhaps the duty/task list, then select the appropriate option.

```
UPDATE:  ESC executes.  DEL aborts.
  CTRL P for previous value.  CTRL W for help.      ## 1: cip files##

                        CIP Information - screen 1

Job Title :
   [WORD PROCESSOR                                                    ]

CIP Code :      [07.0608]
CIP Title :     [WORD PROCESSING                                      ]
CIP Desc :      [     Word processing is an instructional program t]
                [hat prepares individuals to edit and produce writt]
                [en communication utilizing special-purpose machine]
                [s to correct, format, and print information.  CIP ]
                [07.0303 is a related instructional program.       ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
                [                                                  ]
```

Figure 52

Entering Questionnaire Results

A job/task inventory may be entered into COMTASK either online, as described in the earlier section of this chapter, or it may be mailed to COMTASK for the staff there to enter. In either case, the inventory will be checked to eliminate or

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correct duplicate tasks, correct data not consistent with data already in the database, or modify data that does not follow the guidelines in the COMTASK Manual. When the inventory has had all of these changes completed, it can be used to prepare a set of questionnaires.

These questionnaires are administered to people who work at this job. It consists of two parts. One part asks some demographic data about the worker; the other part asks which tasks are performed and what equipment is used to perform the task. A second questionnaire is sent to the employee's company for some demographic data about the company. (Sample copies of all of these are found in the Appendices of the COMTASK Manual.)

Once you have all the completed questionnaires, you are almost ready to enter the results into COMTASK. First, group each worker questionnaire with the corresponding company questionnaire. You will be first entering one company's data and then the data for each of that company's workers; when finished, you will enter data for a second company and its worker's responses, and so on. Now you are ready to begin data entry.

You should follow the procedures described earlier to login and reach the [Addinfo] menu (See Figure 27). The questionnaires were completed as part of a survey and so you should select the SURVEY option. This will direct you to the [Survey] menu shown in Figure 53.

```
[Survey]
DATE: Tue Nov 27 11:24 1984          MENU                    USER: example

                              SURVEY INFORMATION

    The information you wish to enter is the result of a survey
    administered by you for a specific job title.  Completed
    questionaires should be grouped by company with each company
    form followed by the questionaires for that company's employees.
    The data you add should include company information and worker
    information including the duties and tasks performed and the
    equipment used by each worker.


Your choices are:

        0 - HELP        (how to use this menu)
        1 - COMPANY     (add worker information for a company)
        2 - MAIN        (return to MAIN MENU: exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 53

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The [Survey] menu differs somewhat from other menus in that there is only one direct option. Press the <1> key if you are ready to enter the survey information. You will soon see the display shown in Figure 54 and, after you press <RETURN>, you will get the display shown in Figure 55. The job we want is that of word processor and so this is typed into the space for the job title in Figure 55.

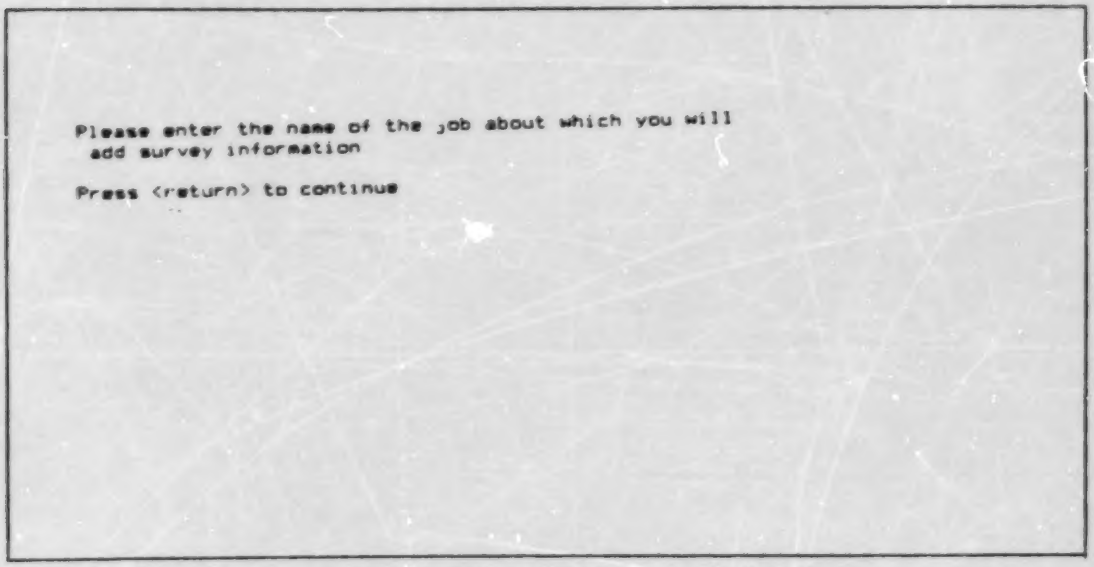

Figure 54

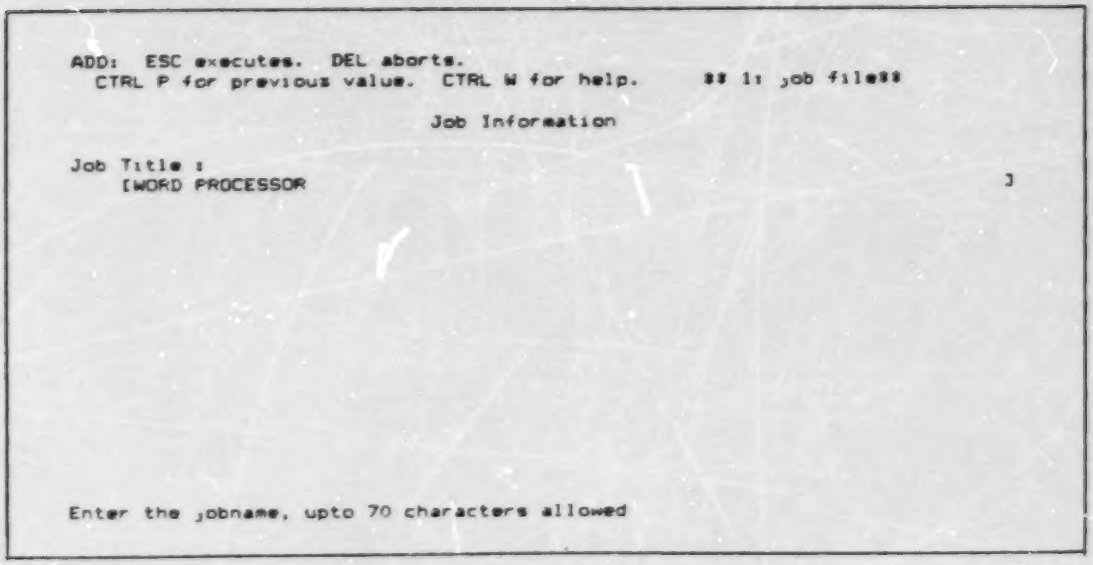
ADD: ESC executes. DEL aborts.
CTRL P for previous value. CTRL W for help. ** 1: job files**
Job Information
Job Title :
[WORD PROCESSOR
Enter the jobname, upto 70 characters allowed

Figure 55

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When you have entered the job title, press <ESC>. You will get the usual "Program over. working. . ." message. This is followed by a request to press <RETURN>. Shortly the display in Figure 56 is on the screen followed shortly by the one in Figure 57. The first item, the title of the job, has already been entered.

```
Program over.

working...
Now, enter information about the company

Press <return> to continue
```

Figure 56

```
ADD:  ESC executes.  DEL aborts.
  CTRL F for previous value.  CTRL W for help.      ## 1: t_company files##

                        Company Information - screen 1

Job Title :
    [WORD PROCESSOR                                                        ]

Company description :   [                                                  ]
                        [                                                  ]

State in which situated :       [  ]
County in which situated :      [          ]

No of employees in Company :
(See options below)             [0]

Approximately how many people at this company have this job title ? [0     ]

Company Survey Date :           [00/00/00]

100 characters max
```

Figure 57

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On the second line you should type in the description of the company from the last page of the company survey. There is room here for two entries, one on each line, for those companies that are unable to select only one. The next entry is the two-letter post office abbreviation for the state in which the company is located. This is followed by the name of the county where the company is located. A one-digit code for the size of the company should be entered. The code is given at the bottom of the screen. Last, you should enter the date the survey was completed. The current date is automatically printed in this space. A completed version is shown in Figure 58.

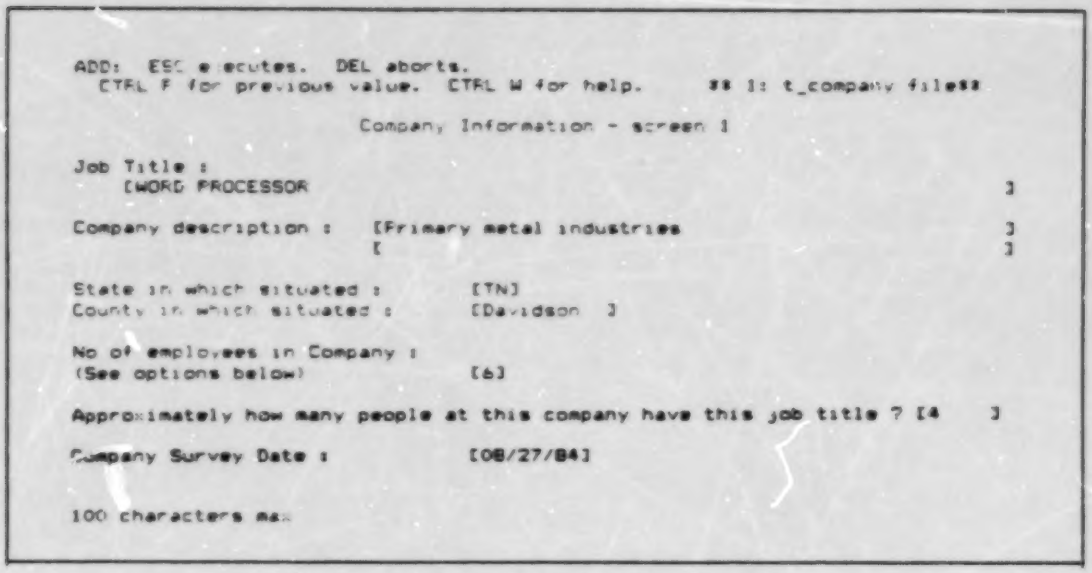
ADD: ESC executes. DEL aborts.
CTRL F for previous value. CTRL W for help. ## 1: t_company files#
Company Information - screen 1
Job Title :
[WORD PROCESSOR]
Company description : [Primary metal industries]
[ ]
State in which situated : [TN]
County in which situated : [Davidson]
No of employees in Company :
(See options below) [6]
Approximately how many people at this company have this job title ? [4]
Company Survey Date : [08/27/84]
100 characters max

Figure 58

Proofread this carefully. You will not have a chance to correct it. When you have finished, press <ESC>. You should see the usual "Program over." message, and after you press <RETURN>, you get the display shown in Figure 59.

The first two items -- the title of the job and the company description -- will be entered from the information previously obtained. Most of the remainder of the information is obtained from the "Worker Background Information" page of the worker's questionnaires. Look at the display in Figure 59. This worker has the job title of "word processing specialist", has had this job title three-years-and-four-months, has been with the company for 18 years, is a 37-year-old female with 13 years of education. When you have entered all data correctly, press <ESC>. If you want to make corrections on a previous line, press <RETURN> until the cursor reaches that line.

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After you press <ESC>, you will get the display shown in Figure 60. Read the message and then press <RETURN>.

The equipment list will be displayed (see Figure 61). It should be the same list that was on the questionnaire. You should check this carefully because you will be entering the

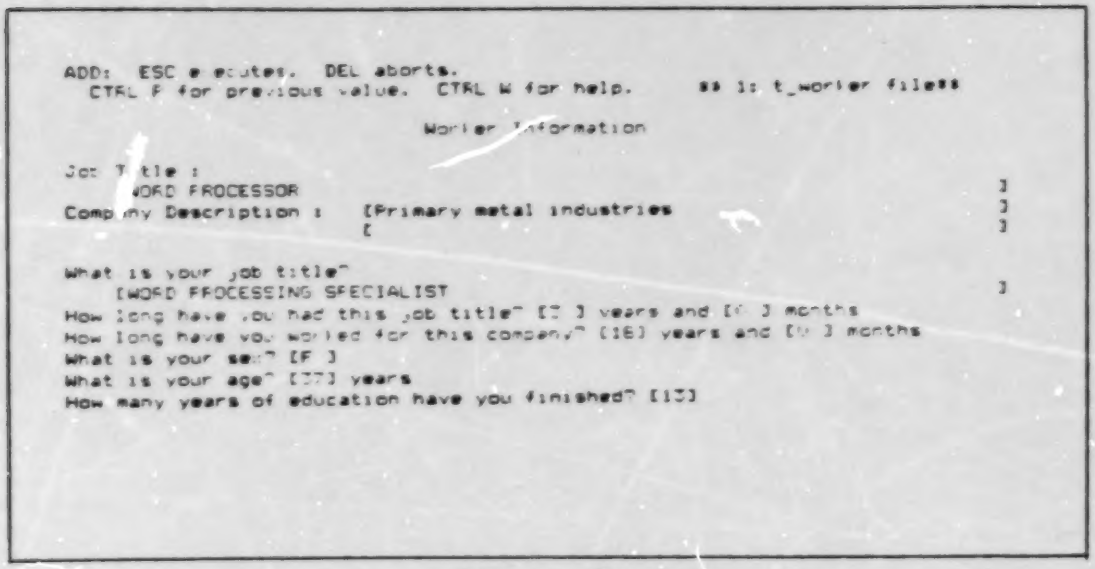
ADD: ESC executes. DEL aborts.
CTRL P for previous value. CTRL W for help.
Worker Information
Job Title :
WORD PROCESSOR
Company Description : [Primary metal industries
What is your job title?
[WORD PROCESSING SPECIALIST
How long have you had this job title? [ ] years and [ ] months
How long have you worked for this company? [18] years and [ ] months
What is your sex? [F]
What is your age? [37] years
How many years of education have you finished? [13]

Figure 59

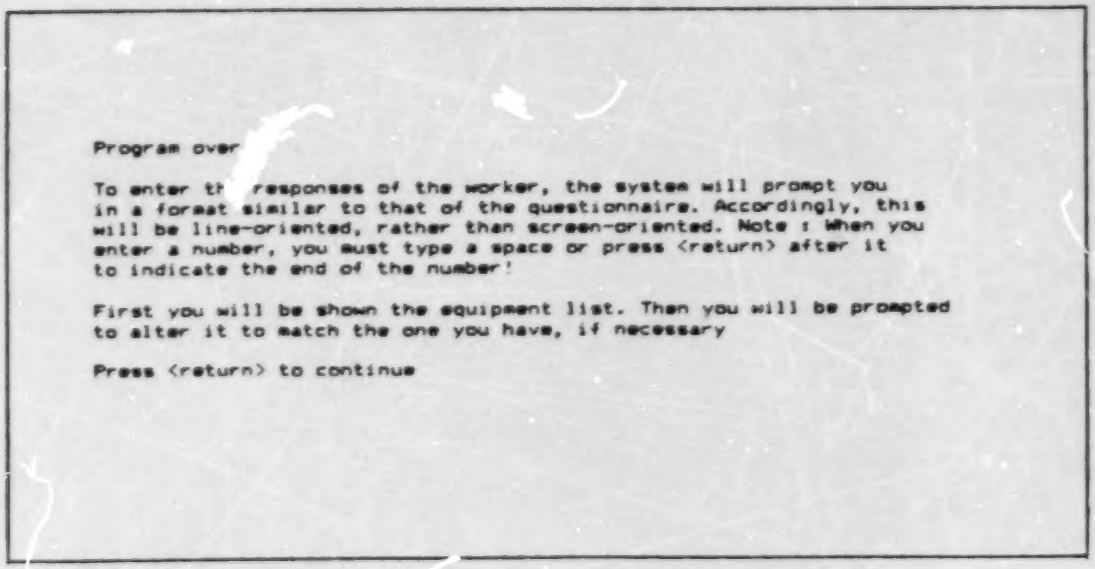
Program over
To enter the responses of the worker, the system will prompt you in a format similar to that of the questionnaire. Accordingly, this will be line-oriented, rather than screen-oriented. Note : When you enter a number, you must type a space or press <return> after it to indicate the end of the number!
First you will be shown the equipment list. Then you will be prompted to alter it to match the one you have, if necessary
Press <return> to continue

Figure 60

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number for each piece of equipment in much the same way as the people conducting the questionnaire. You could delete some of the equipment but this will alter the numbering so that it will not correspond with the questionnaire; therefore this practice is discouraged. You also have the opportunity to add any pieces of equipment that the people who took your survey added to the list. When you are finished, press <RETURN>.

You will next be shown the duties and tasks for this job (see Figure 62). After each task is the word "Choices:." Type

```
Press <return> to continue

                                EQUIPMENT LIST

Choices :
   1.  I do not perform this task
   2.  I do this task, but no equipment is used

I perform this task and use the following equipment.
   3.  Chair
   4.  Desk
   5.  Order form
   6.  Paper
   7.  Pencil
   8.  Ruler
   9.  Telephone
  10.  Typewriter
  11.  Word Processing work station

Do you wish to delete any of the above items? (y or n) y
Enter the number of the item you wish to delete
press carriage return after entering the number
Enter just carriage return to quit
```

Figure 61

```
                            INSTRUCTIONS

Now, taskname will be displayed for each duty.
After each task, you will be prompted for Choices
Enter the numbers as in the questionnaire, separated by blanks
At the end of the list of choices,
you must press carriage return twice to show you are through
If you wish to correct a previous error, please wait till the end of the duty.
Then you will be given an opportunity to revise those entries

Press <return> to continue

JOB :  WORD PROCESSOR


Duty :  Performing secretarial/clerical activities


Task :  Order supplies for office from outside supplier
Choices : 3 4 7

Task :  Make travel arrangements
Choices :
```

Figure 62

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the numbers for the equipment that this worker used. Separate each number by a space. Press <RETURN> twice to go to the next task.

When you have finished entering the equipment for the last task in the duty, the screen will display the series of questions at the bottom in Figure 63. Here you can add additional tasks written in by the worker, return to correct a previous entry, and indicate if you have another worker's questionnaire to enter.

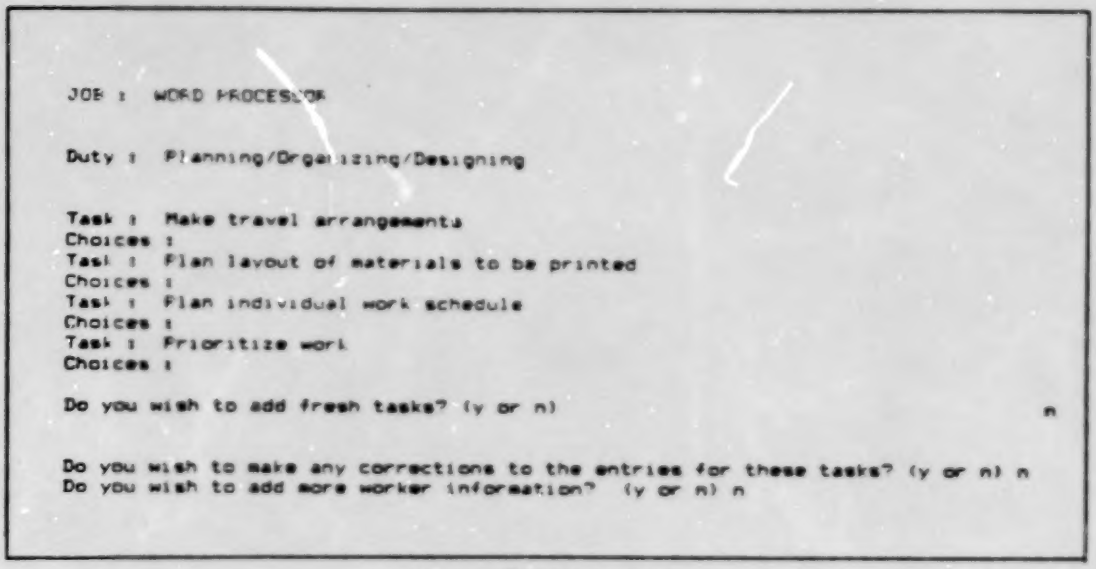
JOB : WORD PROCESSOR
Duty : Planning/Organizing/Designing
Task : Make travel arrangements
Choices :
Task : Plan layout of materials to be printed
Choices :
Task : Plan individual work schedule
Choices :
Task : Prioritize work
Choices :
Do you wish to add fresh tasks? (y or n) n
Do you wish to make any corrections to the entries for these tasks? (y or n) n
Do you wish to add more worker information? (y or n) n

Figure 63

Conclusion

This chapter briefly describes the procedures that should be followed for adding a job/task inventory to the database. Instructions show how to add the results of the worker questionnaire into the database.

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CHAPTER VI
HELP PAGES

Each menu in the database contains a Help page which further explains the options available. If you are uncertain about the choices that appear with a given menu, then consult the Help page for that menu. Keep in mind that a Help page is not a menu; therefore, the options may not be selected while the Help page is on the screen. The Help page only provides further clarification of the options available from the menu. You must always press <RETURN> after you have read the Help page and then make your selection.

Help pages are available for all of the menus. The format of a Help page will always have the word HELP in the center of line 2. The complete menu name of the Help page will appear directly below the word HELP.

The left-hand corner of line 1 contains the abbreviated title for the Help page. As with the Menu pages, the abbreviated title is placed in brackets. Each abbreviated Help page name ends with a question mark. The remainder of the abbreviated name is identical to its corresponding menu name. Thus, the Help page for [Bulletin] is [Bulletin?] and the Help page for [Task2] is [Task2?]. You can use the abbreviated name to directly access a Menu or Help page from any place in the system.

As was true with the Menu pages, line 2 contains the current date and time at the left, the word "MENU" in the center, and the word "USER:" and your user I.D. at the right. The text explaining the Help page appears below the name of the page. For example, Figure 64 contains the Help page for [Titles].

There are two ways to access the Help page for a given menu. If you want the Help page for the menu that is displayed on the screen, then select the HELP option by pressing the zero <0> key. If you want the Help page for any menu, it can be reached by typing the abbreviated menu name followed by a question mark and pressing <RETURN>. For example, if you have the [Titles] menu on the screen and you want to look at the Help page for [Main] type <Main?> and press <RETURN>.

The following is an example of how to access and use a Help page. After logging in, the COMTASK Database Bulletin Board menu

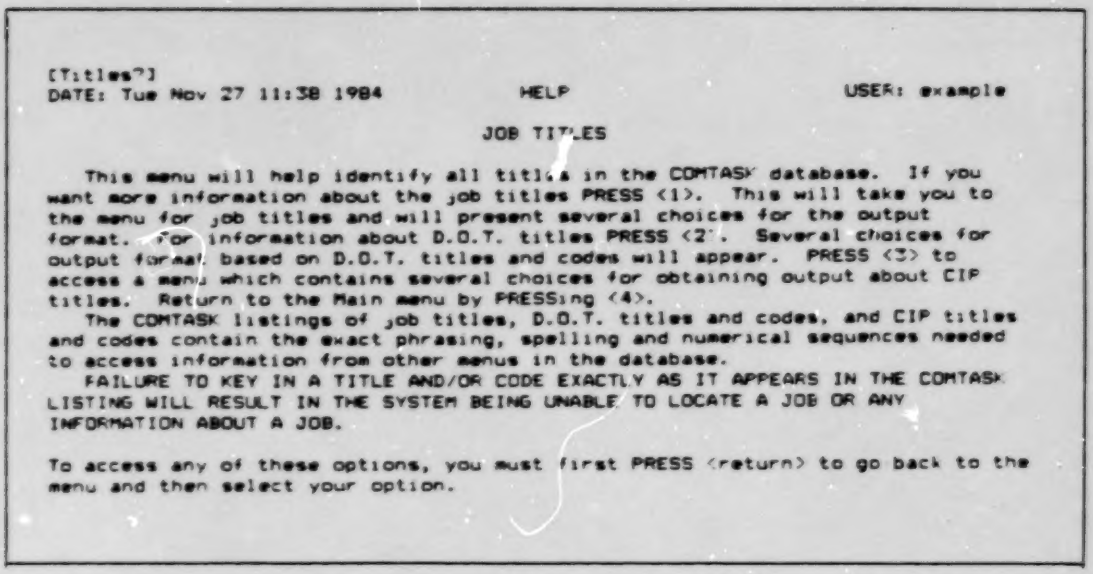
[Titles?]
DATE: Tue Nov 27 11:38 1984
HELP
USER: example
JOB TITLES
This menu will help identify all titles in the COMTASK database. If you want more information about the job titles PRESS <1>. This will take you to the menu for job titles and will present several choices for the output format. For information about D.O.T. titles PRESS <2>. Several choices for output format based on D.O.T. titles and codes will appear. PRESS <3> to access a menu which contains several choices for obtaining output about CIP titles. Return to the Main menu by PRESSing <4>.
The COMTASK listings of job titles, D.O.T. titles and codes, and CIP titles and codes contain the exact phrasing, spelling and numerical sequences needed to access information from other menus in the database.
FAILURE TO KEY IN A TITLE AND/OR CODE EXACTLY AS IT APPEARS IN THE COMTASK LISTING WILL RESULT IN THE SYSTEM BEING UNABLE TO LOCATE A JOB OR ANY INFORMATION ABOUT A JOB.
To access any of these options, you must first PRESS <return> to go back to the menu and then select your option.

Figure 64

appears on the screen. HELP is option 0, as in all the menus. Since you want an explanation of your options you press <0> (zero). The Help page shown in Figure 65 appears on the screen.

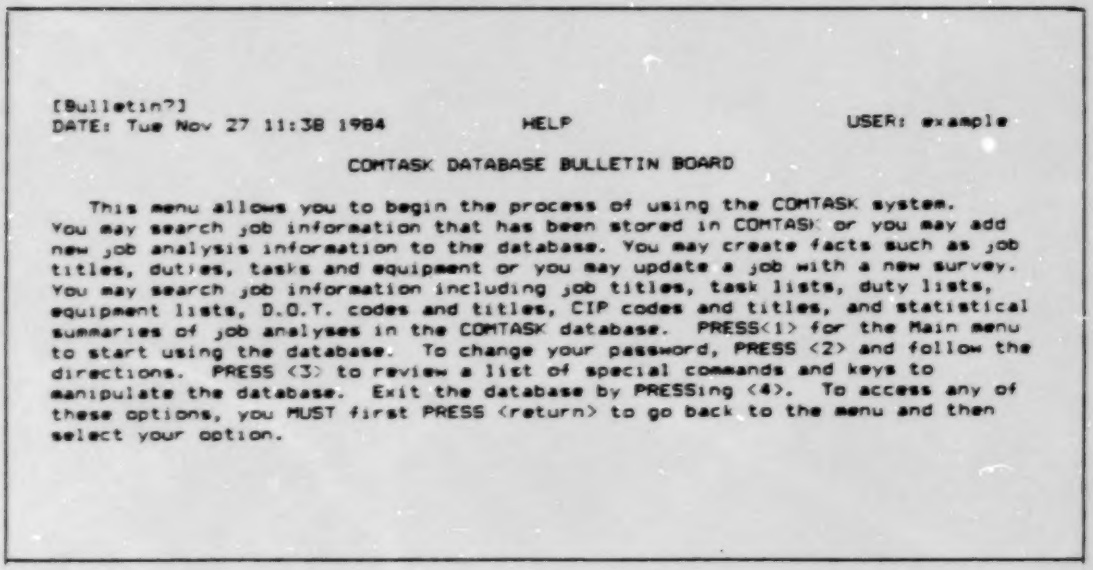
[Bulletin?]
DATE: Tue Nov 27 11:38 1984
HELP
USER: example
COMTASK DATABASE BULLETIN BOARD
This menu allows you to begin the process of using the COMTASK system. You may search job information that has been stored in COMTASK or you may add new job analysis information to the database. You may create facts such as job titles, duties, tasks and equipment or you may update a job with a new survey. You may search job information including job titles, task lists, duty lists, equipment lists, D.O.T. codes and titles, CIP codes and titles, and statistical summaries of job analyses in the COMTASK database. PRESS<1> for the Main menu to start using the database. To change your password, PRESS <2> and follow the directions. PRESS <3> to review a list of special commands and keys to manipulate the database. Exit the database by PRESSing <4>. To access any of these options, you MUST first PRESS <return> to go back to the menu and then select your option.

Figure 65

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This Help page gives additional descriptions of the options available on the [Bulletin] menu. To activite any of the choices you must return to the [Bulletin] menu. Do this by pressing <RETURN>. The Help page [Bulletin?] indicates that four choices are available through this menu. Press <1> to access the Main menu. Press <2> to change your password. Press <3> to review a special list of commands and keys to manipulate the database, or press <4> to exit the database.

Suppose you want to start using the database. The Help menu just described indicates that you should press <1>. When you press <1> the computer "beeps" and flashes the phrase "Sorry, 1 is not an available selection." What happened? Look at the last line of the [Bulletin?] page. You forgot to press <RETURN> before you pressed <1>.

Now, press <RETURN> and then press <1>. The menu shown in Figure 66 will appear on the screen.

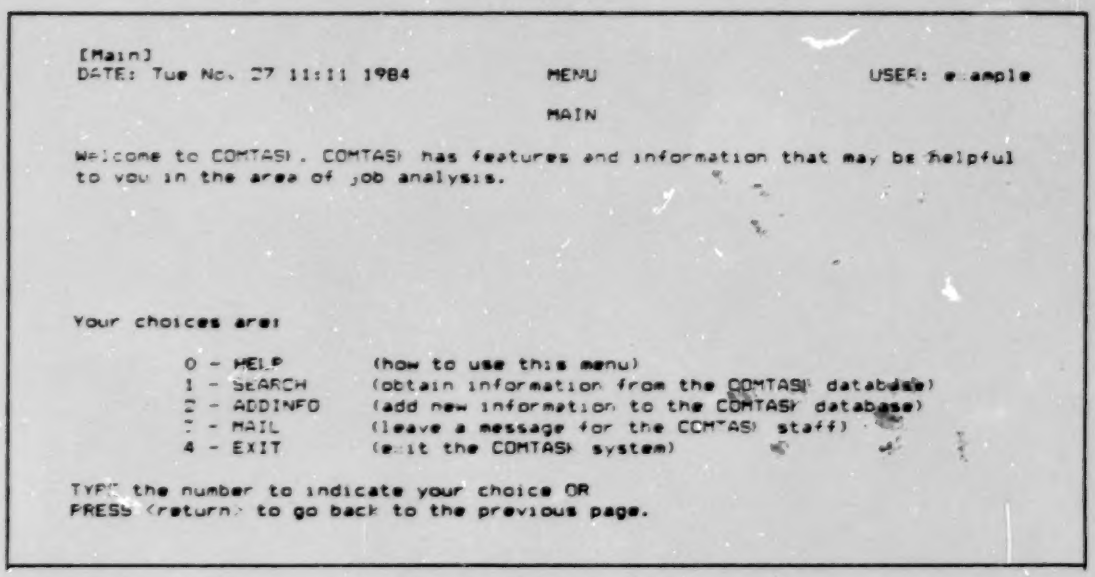
[Main]
DATE: Tue Nov 27 11:11 1984
MENU
MAIN
USER: example
Welcome to COMTASK. COMTASK has features and information that may be helpful to you in the area of job analysis.
Your choices are:
0 - HELP (how to use this menu)
1 - SEARCH (obtain information from the COMTASK database)
2 - ADDINFO (add new information to the COMTASK database)
3 - MAIL (leave a message for the COMTASK staff)
4 - EXIT (exit the COMTASK system)
TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.

Figure 66

Again, option 0 is the Help page. If you want to obtain more information about the choices available through the Main menu, press <0>. The Help page for the Main menu, [Main?], appears on the screen (see Figure 67).

This Help page informs you that five choices are available through the Main menu. You can continue to search through the database by pressing <1>. Option 2 allows you to add new

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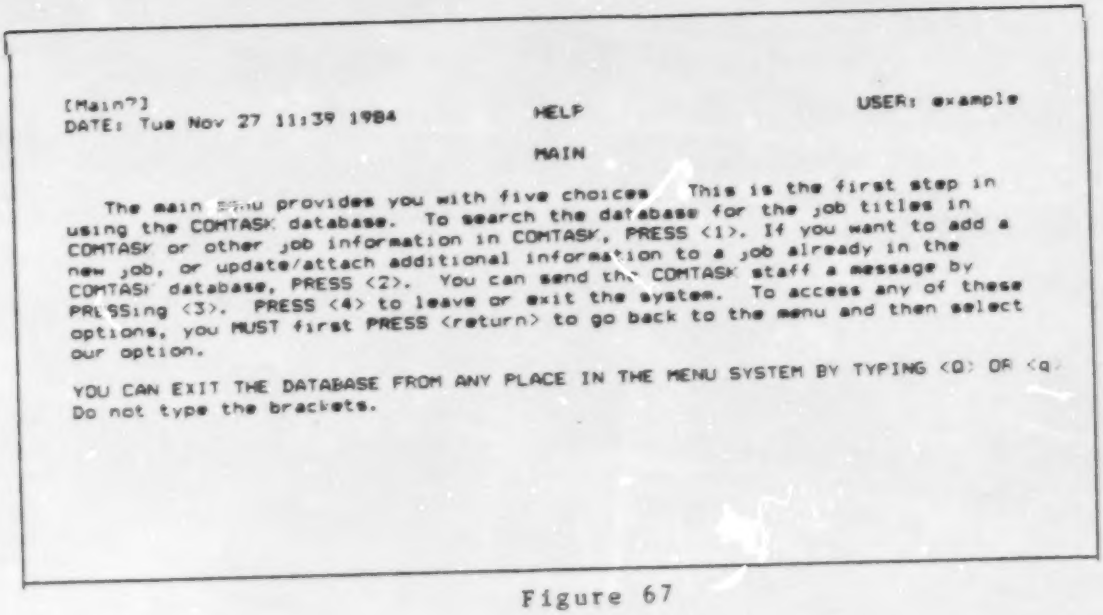
[Main?]
DATE: Tue Nov 27 11:39 1984
HELP
USER: example
MAIN
The main menu provides you with five choices. This is the first step in using the COMTASK database. To search the database for the job titles in COMTASK or other job information in COMTASK, PRESS <1>. If you want to add a new job, or update/attach additional information to a job already in the COMTASK database, PRESS <2>. You can send the COMTASK staff a message by PRESSing <3>. PRESS <4> to leave or exit the system. To access any of these options, you MUST first PRESS <return> to go back to the menu and then select our option.
YOU CAN EXIT THE DATABASE FROM ANY PLACE IN THE MENU SYSTEM BY TYPING <Q> OR <q>
Do not type the brackets.

Figure 67

information about a job in COMTASK or to add a new job to the database. Access to a mail system is available through option 3. As usual, you exit the system by pressing <4>. Remember to press <RETURN> to get back to [Main].

If you want to continue to search the database for job information, press <RETURN> and then press <2>. The following menu will appear on the screen (see Figure 68).

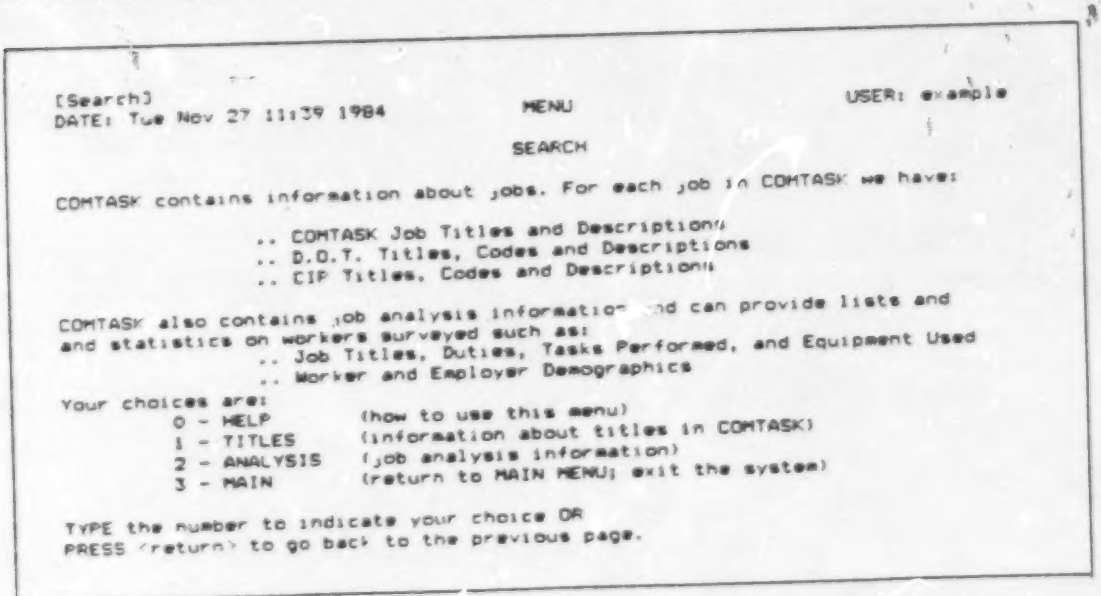
[Search]
DATE: Tue Nov 27 11:39 1984
MENU
USER: example
SEARCH
COMTASK contains information about jobs. For each job in COMTASK we have:
.. COMTASK Job Titles and Descriptions
.. D.O.T. Titles, Codes and Descriptions
.. CIP Titles, Codes and Descriptions
COMTASK also contains job analysis information and can provide lists and
and statistics on workers surveyed such as:
.. Job Titles, Duties, Tasks Performed, and Equipment Used
.. Worker and Employer Demographics
Your choices are:
0 - HELP (how to use this menu)
1 - TITLES (information about titles in COMTASK)
2 - ANALYSIS (job analysis information)
3 - MAIN (return to MAIN MENU; exit the system)
TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.

Figure 68

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The first option on this menu is the Help page. When <0> is pressed, the information shown in Figure 69 appears on the screen.

```
[Search?]
DATE: Tue Nov 27 11:40 1984          HELP                    USER: example

                                SEARCH

   This menu will take you farther into the COMTASK database to search for job
information.  PRESS <1> to obtain information about job titles, such as a list
of COMTASK job titles; D.O.T. titles, codes, and descriptions; or CIP titles,
codes, and descriptions.  By PRESSing <2> you can review job analysis
information, such as tasks, duties, equipment for a specific job, and
information about a specific CIP, task or piece of equipment.  Return to the
Main menu by PRESSing <3>.
   It is imperative that when searching through the Analysis menu for job,
task, equipment, or CIP specific information that you FIRST know the exact way
the specified item is listed in the COMTASK database.
   It is strongly recommended that you go through a search of Titles to
determine the correct phrasing and spelling of job titles listed in COMTASK.
To locate this information TYPE <Jobtitles> to review job titles in COMTASK.
To return to the Search menu TYPE <Search>.  The way that you key in a job
title must match the way it is listed in COMTASKexample     Failure to phrase
or spell a job title correctly will result in failure of the database to locate
information about the job.  To access any of these options, you must first
PRESS <return> to go back to the menu and then select your option.
```

Figure 69

This is an important Help page because it not only tells you about the types of output format which can be accessed (information about job titles and job analysis information), but it also informs you that accessing information depends on the accuracy of the information you key in. If you want information about job titles, tasks, equipment, or CIP codes, you must key in these items exactly as they are listed in the database. The [Search?] page contains the steps to be taken to check correct listing of titles, tasks, equipment, or CIP codes. This information will be repeated again in other Help pages, but this is the first notice of the need for accuracy.

The following example outlines the need for accuracy. A user is searching through the database for information about the tasks required in the job of WORD PROCESSOR. From the [Search] menu the user reaches the [Analysis] menu shown in Figure 70.

Option 2 is pressed because the user wants information about a specific task. The menu in Figure 71 appears on the screen.

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```
[Analysis]
DATE: Tue Nov 27 11:12 1984          MENU                    USER: example

                              ANALYSIS

JOB SPEC will allow you to determine the duties, tasks, and/or equipment for
one or more specific jobs.  TASK SPEC will allow you to determine the jobs,
duties, and/or equipment for a specific task. EQUIP SPEC will allow you to
determine the jobs, duties, and/or tasks for which a specific piece of
equipment is used.  CIF SPEC will provide you with the jobs, duties, tasks,
and/or equipment for a specific CIF.  Additional questions will help refine
your request.

Your choices are:
        0 - HELP          (how to use this menu)
        1 - JOB SPEC      (information about 1 or more specific jobs)
        2 - TASK SPEC     (information about a specific task)
        3 - EQUIP SPEC    (information about a specific piece of equipment)
        4 - CIF SPEC      (information about a specific CIF)
        5 - MAIN          (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 70

```
[Taskspec]
DATE: Tue Nov 27 11:41 1984          MENU                    USER: example

                           TASK SPECIFIC

There are four general kinds of information you can get about a specific task:
(1) a list of jobs where the task appears; (2) a list of duties in which the
task appears; (3) a list of equipment used in a specific task; (4) a list of
jobs and equipment for a specific task.  The starred choices reflect data
reported by workers surveyed for COMTASK.


Your choices are:

        0 - HELP          (how to use this menu)
        1 - JOB TASK      (a list of jobs where a given task is performed)
        2 - DUTY TASK     (a list of duties where a given task is performed)
        3 - EQUIP TASK*   (a list of equipment used in a given task)
        4 - JOB&EQUIP *   (a list of job titles and equipment for a given task)
        5 - MAIN          (return to MAIN MENU; exit the system)

TYPE the number to indicate your choice OR
PRESS <return> to go back to the previous page.
```

Figure 71

The user bypasses the Help page and presses <1> because the desired output is a list of jobs where a given task is performed. The user is prompted to key in the task of interest. The user keys in "Puts together information from two different files." The database responds that no information exists about this task. What has happened? Had the user read the Help page

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he or she would have been advised about the importance of accuracy in keying information into the database. If the user had followed the directions in the Help menu, and reviewed the listing of tasks in COMTASK, he or she would have discovered that the task of interest is worded differently. The task should have been entered as "Merge information from two different data files."

The Help page for the [Taskspec] menu is shown in Figure 72. You can see how the important instruction about correct keying of information is contained in the [Taskspec?] menu.

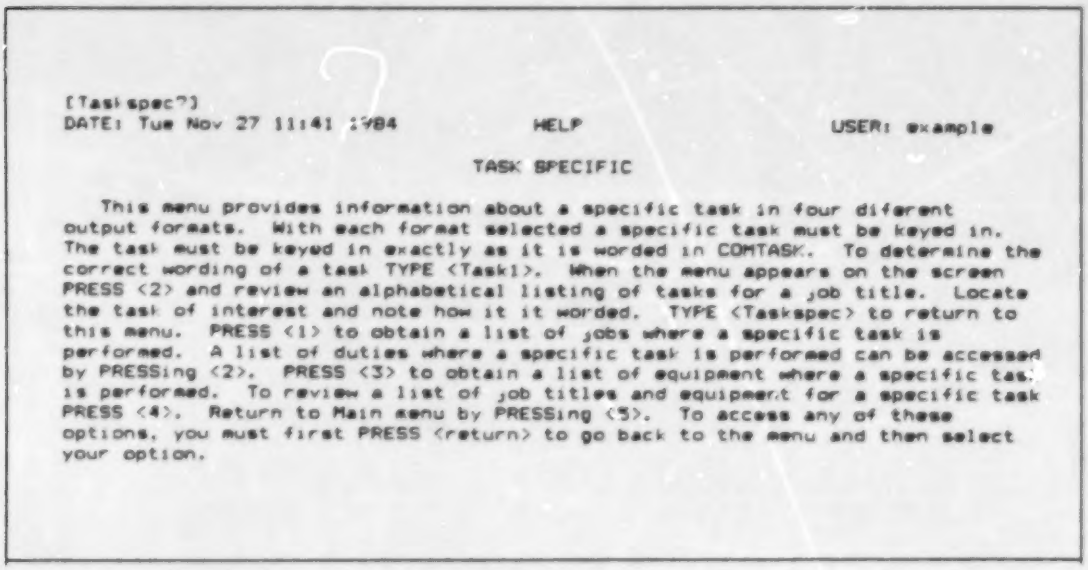
[Taskspec?]
DATE: Tue Nov 27 11:41 1984
HELP
USER: example
TASK SPECIFIC
This menu provides information about a specific task in four diferent output formats. With each format selected a specific task must be keyed in. The task must be keyed in exactly as it is worded in COMTASK. To determine the correct wording of a task TYPE <Task1>. When the menu appears on the screen PRESS <2> and review an alphabetical listing of tasks for a job title. Locate the task of interest and note how it it worded. TYPE <Taskspec> to return to this menu. PRESS <1> to obtain a list of jobs where a specific task is performed. A list of duties where a specific task is performed can be accessed by PRESSing <2>. PRESS <3> to obtain a list of equipment where a specific task is performed. To review a list of job titles and equipment for a specific task PRESS <4>. Return to Main menu by PRESSing <5>. To access any of these options, you must first PRESS <return> to go back to the menu and then select your option.

Figure 72

Help pages are designed to clarify and expedite the user's access to information in COMTASK. Help pages should be referred to by all new users so as to avoid search problems.

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CHAPTER VII
DISPLAYING RESULTS

This chapter will list your options for getting printed copies of your search. This can be accomplished in several different ways. The following describes two different methods.

If you have a printer attached to your terminal, you can turn it on and get a printed copy of what appears on the screen. Because most printers are slower than the modem, this may slow your search and increase your cost. The advantage of using this method is that you will have a printed copy immediately. The disadvantage is the cost incurred by the additional connection for your long distance telephone call.

Your second option is to have the results of your work printed by the COMTASK computer and mailed to you. The advantage of this method is that you will not have to pay for the extra long distance cost associated with printing at your terminal. It is also an advantage for people who do not have a printer. The disadvantage of this method is that it will take a few days for you to receive your copy. If you are not in a hurry, this may be the best method for you. At present this service is free.

If you have a video terminal which supports a printer, then you can print your own results by using its printing functions as discussed above. Two common printing functions on modern video terminals are the "print screen" function and the "print output" function. A "print screen" function sends to the terminal personal printer exactly what appears on the current video screen. A "print output" function sends to the personal printer each line of output that is sent to the terminal. This function can be turned on and off for the selective printing of output. Consult your terminal's users manual for instructions on the use of these facilities.

Three factors to consider before printing a file are:

- Size of the output (i.e., how much long distance connect time will it take to print?)
- COMTASK charge for printing, handling, and mailing the output to you (At present, there is no charge for this option.)
- Time requirements (i.e., how soon do you need the hard copy?)

APPENDIX A

CONTASK Database Tree Chart

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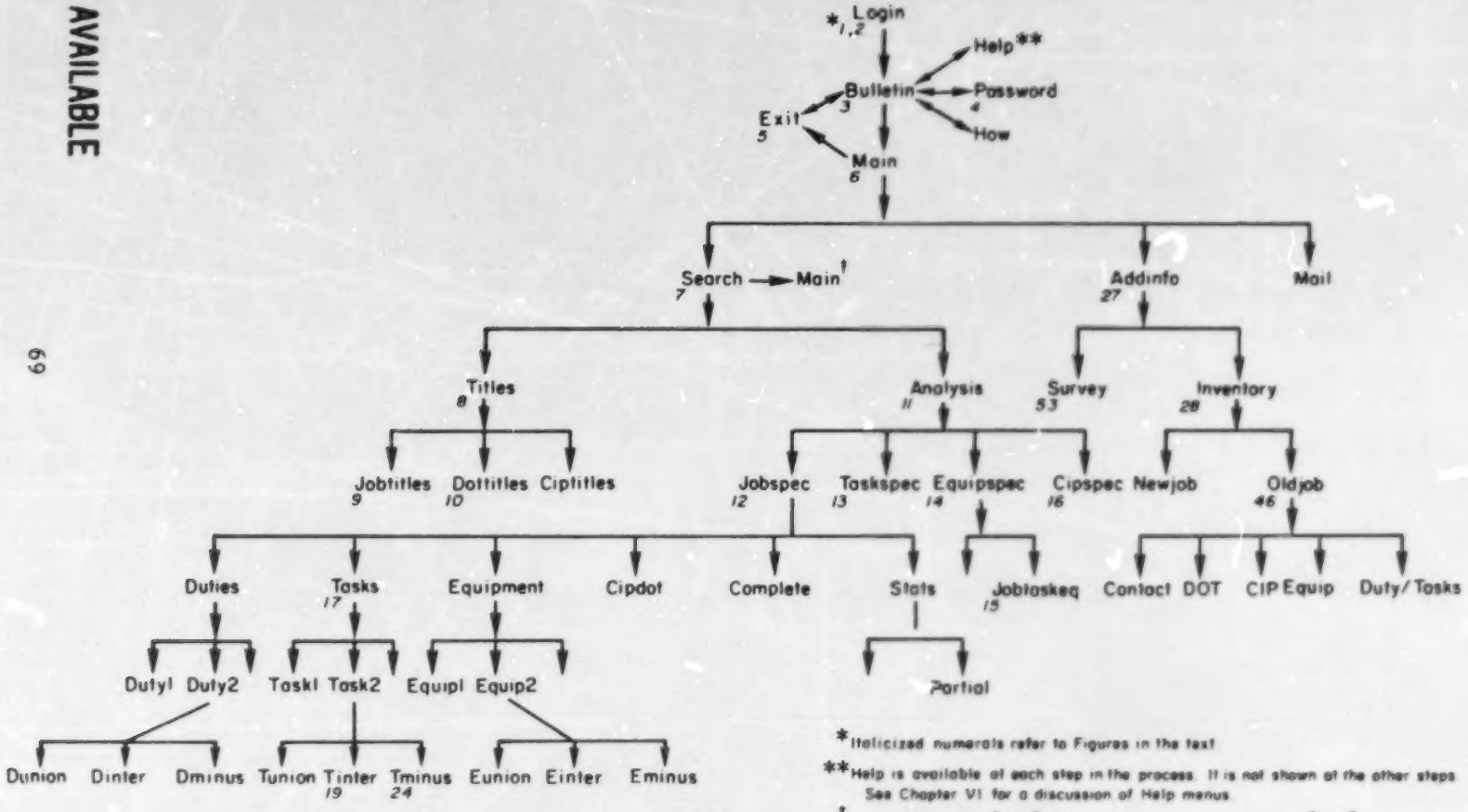
COMTASK Database Tree Chart



*Italicized numerals refer to Figures in the text.

**Help is available at each step in the process. It is not shown at the other steps. See Chapter VI for a discussion of Help menus.

†Each step below [Main] also has the option to return to [Main].

APPENDIX B

Explanation of Union, Intersection, and Minus

For some COMTASK searches you may want to request information about two or more job titles. To select the correct option you will need to understand three terms that are being used: union, intersection, and minus.

As each term is discussed, some examples will be shown. Each example will use the following groups, where the lower case letters represent members of the group:

Group A: a,b,c,d,e

Group B: a,d,e,f,g

Group C: c,d,g,h,i,j,k

If each group is represented by a circle with the members of the group written inside the circle, the individual groups would look like those shown in Figure 73. By using these circles, we can also represent two of the groups, say A and B, as in Figure 74 or three groups as in Figure 75.

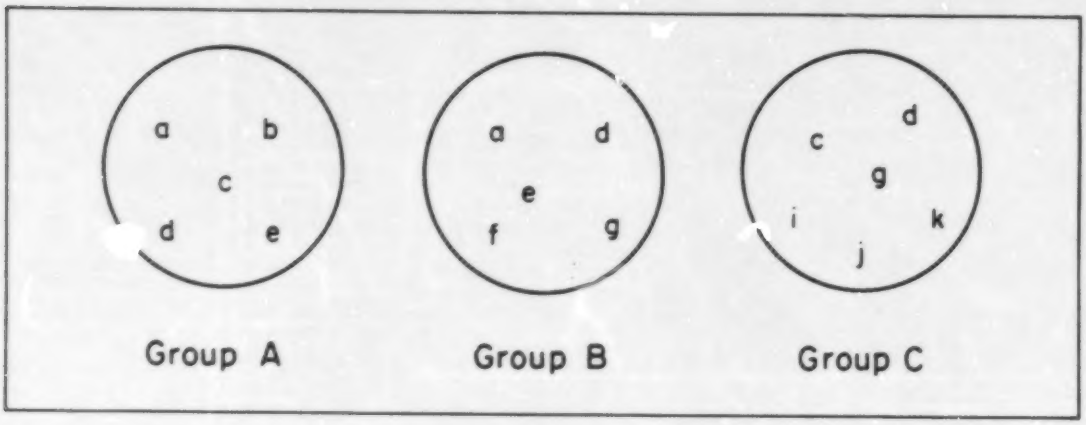


Figure 73

Union

The union of two or more groups consists of all the parts that belong to any one of the groups. The symbol for union is "U", so the union of two groups -- such as A and B -- is written A U B. We will give two examples. The first example is for the union of two groups; the second example is the union of three groups. If there are more than three groups, the union would be determined in a similar manner.

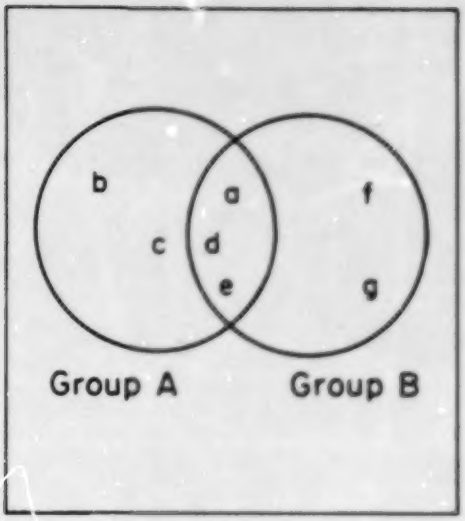


Figure 74

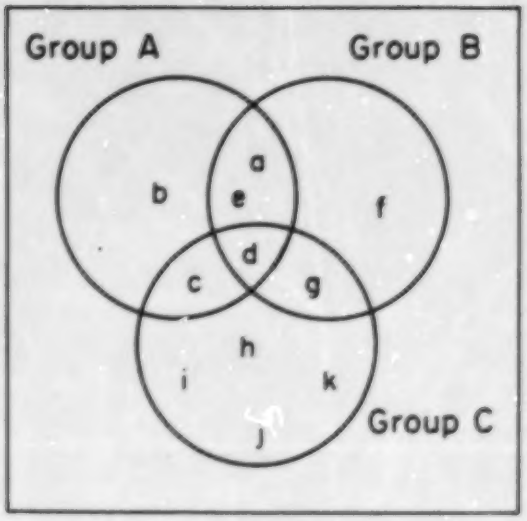


Figure 75

The union of two groups -- A and B -- is shown as the shaded portion of Figure 76. The members of this union -- A ∪ B -- are a,b,c,d,e,f,g. The union of three groups -- A, B, and C -- is shown as the shaded portion of Figure 77. The members of this union -- A ∪ B ∪ C -- are a,b,c,d,e,f,g,h,i,j,k.

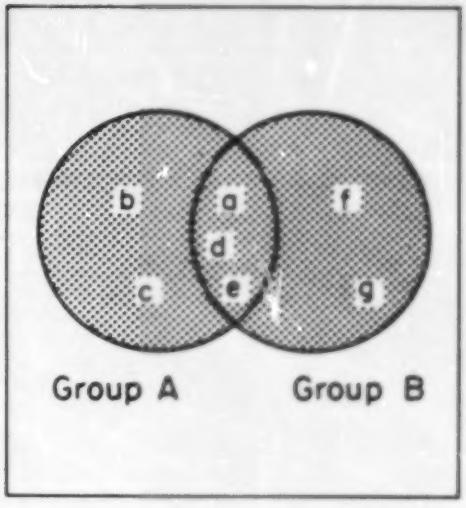


Figure 76

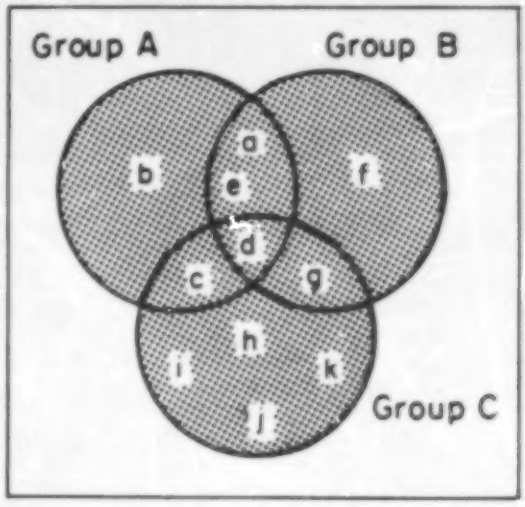


Figure 77

In both of these examples the union includes any member of at least one group. Members that belong to more than one group are considered members of the union.

Intersection

The intersections of two or more groups contains all the members that belong to all of the groups. The symbol for intersection is "$\cap$," an upside-down union symbol. The intersection of two groups is written A $\cap$ B.

The intersection of Group A and Group B is shown as the shaded portion of Figure 78. The members of this intersection -- A $\cap$ B -- are a,b,e. The intersection of Groups A, B, and C is shown as the shaded portion of Figure 79. The only member of the intersection of these three goups is d. If you look at the listing of the three groups, you will see that d is the only member that belongs of each of the groups and so A $\cap$ B $\cap$ C = d.

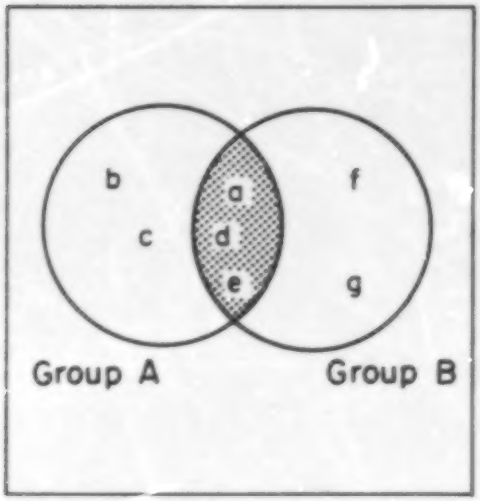


Figure 78

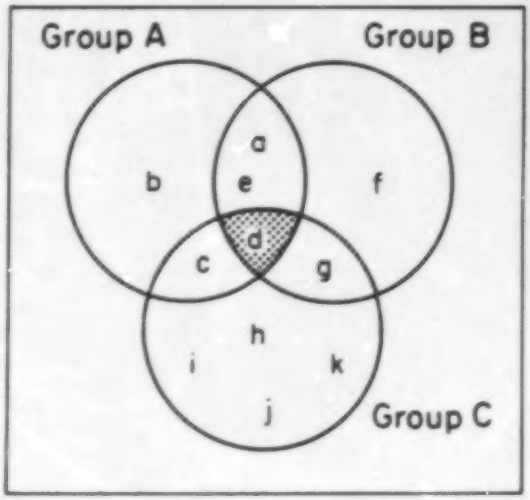


Figure 79

Minus

As you might expect from its title, minus is very similar to subtraction. And as with numbers, you can only subtract one group from another. The result of A - B contains all the members of Group A that do not belong to Group B. Just as the order in which two numbers are subtracted affects the answer, so does the order in which the difference on two groups is found. This is shown in the following example.

Example: Minus with Two Groups

The result of Group A minus Group B is shown as the shaded portion of Figure 80. If these two groups have the members listed earlier, then the members of A - B are b and c.

Notice that A - B is not the same as B - A. The shaded portion of Figure 81 shows that the members of B - A are g and f.

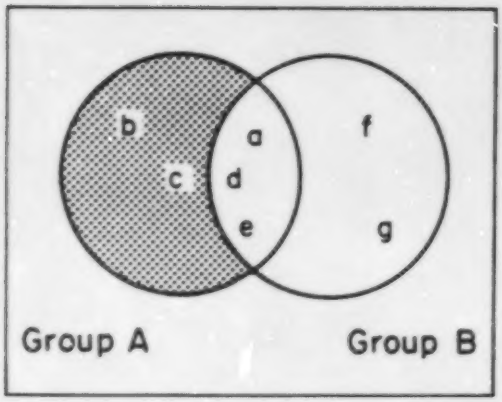


Figure 80

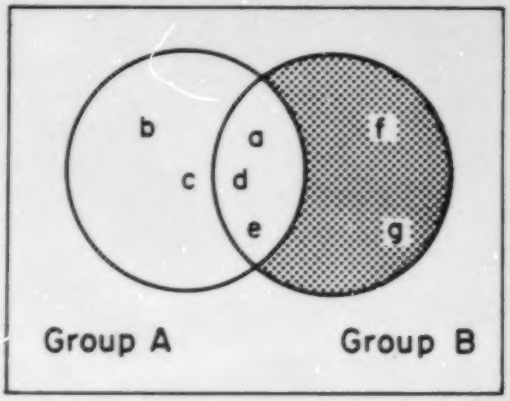


Figure 81

The COMTASK computer program has been designed to always find the difference A - B. Before the program is executed you will be asked to name Group A and Group B. Since A - B is not the same as B - A, it is important that you name these in the correct order. In the programs Group A is referred to as the first group and Group B as the second group.

Example: Minus with Three Groups

With three (or more) groups the process gets more complicated. You will first need to decide which groups belong together. In these examples we show how to determine X - Y. You will need to decide which groups belong to X and which to Y. For example, if you want all the members of A that do not belong to any other group, you let X = A and Y the union of all other groups. In this case with three groups -- A, B, and C -- this would be X = A and Y = B U C. What you would then get is X - Y = A - (B U C) as shown in the shaded portion of Figure 82.

An alternative is shown in Figure 83. Here we find all the members of the union of groups A and B that do not belong to Group C. We put groups A and B in X so X = A ∪ B and let Y = C. The result is the shaded portion of Figure 83 and what we get is X - Y = (A ∪ B) - C.

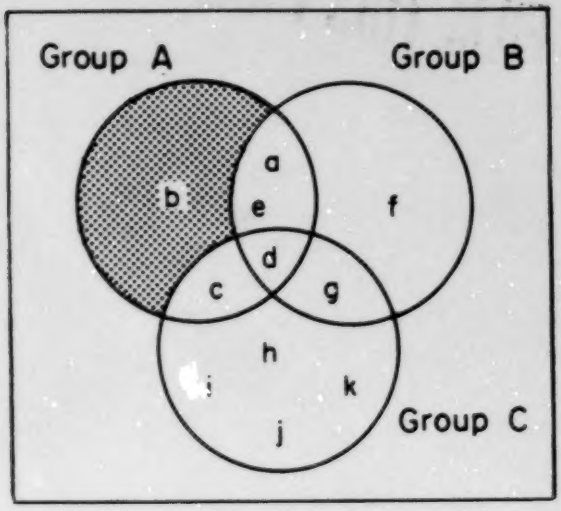


Figure 82

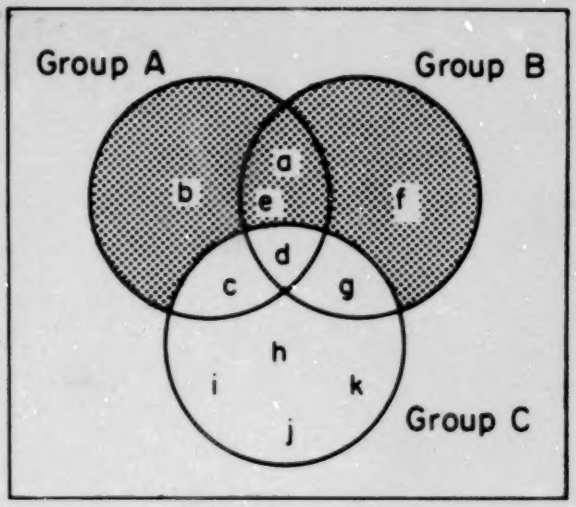


Figure 83

Each time you use the minus function you will need to designate what consitutes the first group and what determines the second group. The members of both groups must be the same. So, if Group X consists of job titles, then Group Y must also consist of job titles. If Group X consists of tasks, then Group Y must also consist of tasks. When you name the members of each group the computer program will automatically form the union of those members.

CHAPTER VIII
TROUBLE SHOOTING

Information in this chapter will help you to determine the cause of problems you may encounter when using the database. The problems described are all system problems. (Problems encountered while searching or adding information to the database are explained in the Help pages for each menu.)

* *

Problem: **BUSY SIGNAL**

The user dials COMTASK and gets a busy signal.

Possible Cause:

- System is in use
- System is not available at the present time
- Wrong number has been dialed

Solution:

- Wait and dial again. Time interval may be on a continuum from a few minutes to an hour or more.
- If busy signal persists, call COMTASK customer service, inquire about the problem, and ask for estimated time before system may be accessed
- Check to make sure you have dialed the correct number.

* *

Problem: **RING BUT NO ANSWER**

Possible Cause:

- System is not available at the present time
- Wrong number has been dialed

Solution:

- Call COMTASK user service. Ask how long the system will be down. Tell where you are calling from (area code and phone number) so the problem may be corrected.
- Check to make sure you have dialed the correct number

* *

Problem: **VOICE ANSWERED DIAL UP OR NO HIGH PITCHED SOUND**

Possible Cause:

- COMTASK staff number has mistakenly answered phone
- Wrong number has been dialed

Solution:

- Notify COMTASK staff of intended hook-up with system
- Check the number dialed and dial again

* *

Problem: **SYSTEM DOESN'T RESPOND TO PASSWORD**

Possible Cause:

- Shift lock on terminal is depressed
- Logged in under wrong user name
- Used wrong password

Solution:

- Check shift lock. Password must be keyed in using the correct case letters.
- Key in the password again
- Check to make sure you are using the correct password
- Check to see if anyone has changed the password
- Check to make sure you are using correct users name
- Key it in again

* *

Problem: **GARBLED MESSAGE ON SCREEN**

Possible Cause:

- User is working at a terminal different from the one to which the user account has been assigned

Solution:

- Check the type of terminal you indicated you would be using when you applied for a COMTASK password. Using that type of terminal, try again to access COMTASK. If you need to have your password reassigned to a new type of terminal, phone or write the COMTASK Staff.

* *

Problem: **SLOW OR NO RESPONSE FROM COMTASK**

Possible Cause:

- System (COMTASK) is down or disabled
- System (COMTASK) is overloaded due to many users accessing information at the present time

Solution:

- Phone COMTASK user service and inquire about problem
- Try the system again at a later time

* *

Problem: **SCREEN SUDDENLY BECOMES BLANK**

Possible Cause:

- Line was disconnected
- User accidently hung up the telephone
- Static or an electrical surge on telephone line caused the system to disconnect
- Problem with user terminal

Solution:

- Check to see if screen was mistakenly turned off
- Check to see if the telephone is properly connected to the modem. If it has been disconnected, hang up the telephone and redial.
- If the problem is one of static or an electrical surge, you will have to hang up and redial. You may want to call the telephone company and ask them to check the line.

* *

Problem: **SCREEN FREEZES**

Possible Cause:

- Problem with user terminal

Solution:

- Turn screen off and back on without hanging up phone
- Refer to terminal manual or call the terminal service representative

HIGH TECHNOLOGY EDUCATION: A PROGRAM OF WORK

The following publications have been developed by the Office for Research in High Technology Education for the U.S. Department of Education's Office of Vocational and Adult Education:

At Home in the Office:

- At Home in the Office: A Guide for the Home Worker

COMTASK:

- Procedures for Conducting a Job Analysis: A Manual for the COMTASK Database
- COMTASK User's Guide

State-of-the-Art Papers:

- The Changing Business Environment: Implications for Vocational Curricula
- Computer Literacy in Vocational Education: Perspectives and Directions
- Computer Software for Vocational Education: Development and Evaluation
- Educating for the Future: The Effects of Some Recent Legislation on Secondary Vocational Education
- The Electronic Cottage
- High Technology in Rural Settings
- (Re)Training Adults for New Office and Business Technologies
- Robots, Jobs, and Education
- Work in a World of High Technology: Problems and Prospects for Disadvantaged Workers